3 HABITAT AND SPECIES DESCRIPTIONS

3.1 GEOLOGY, SOILS, TOPOGRAPHY, AND CLIMATE

3.1.1 GEOLOGY

Much of the following geologic information is drawn or summarized from the Sierra Valley Watershed Assessment (SVRCD 2005).

INTRODUCTION

The California Division of Mines and Geology subdivides California into 12 geologic provinces. A unique combination of geology, topographic relief, and climate distinguishes each province. The Sierra Valley watershed lies within the northern Sierra Nevada geologic province, a continuous mountain range spanning 400 miles extending in a north-northwest direction. The Sierra Nevada province is bordered to the north by the Lake Almanor/Honey Lake area and to the west by the Great Valley province.

The geologic setting of the Antelope Valley Wildlife Area (AVWA) and Smithneck Creek Wildlife Area (SCWA) derives from their location on the volcanic flows of the Sierra Valley watershed. Sierra Valley contains unique topographic features that are attributed partly to being one of the most geologically faulted regions in California, and carved by at least four stages of the Ice Age (DWR 1963, cited in SVRCD 2005). The valley lies among a series of northwest trending bands of volcanic ridges and peaks. Granitic rocks to the west and younger rocks to the east of the depositional Hallelujah Formation bound the valley.

DESCRIPTION

In general, the Sierra Valley watershed consists largely of more recent pyroclastic eruptions and volcanic flows, which lie upon the metavolcanic and granitic basement rock. Locally, rocks of the Sierra Valley can be divided into three general groups: Jurassic and Cretaceous metavolcanic and granitic rocks, Tertiary volcanics, and Quaternary sedimentary deposits. These general rock types are described in more detail below, and rock types specific to the wildlife areas are shown in Exhibit 3.1-1.

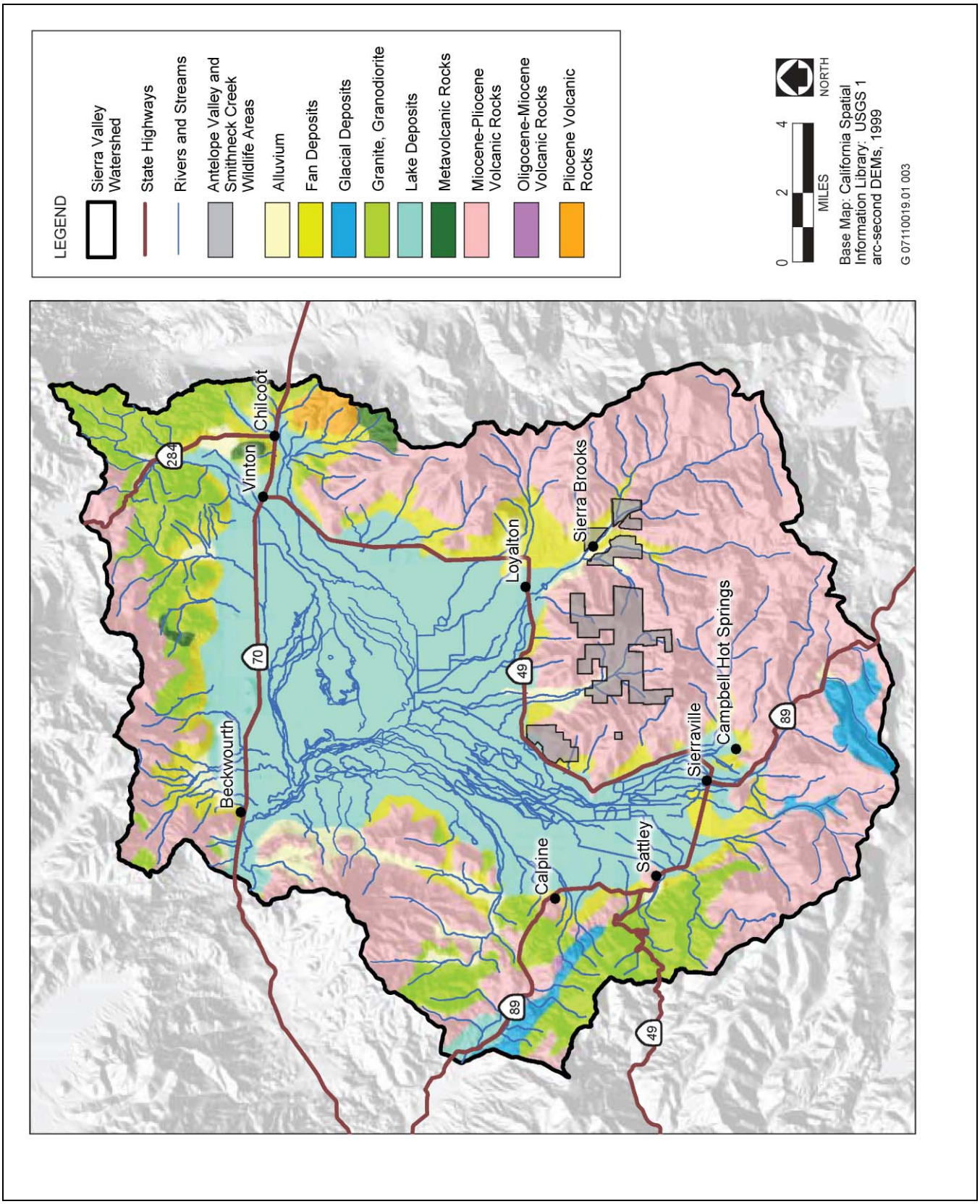
Jurassic and Cretaceous Metavolcanic and Granitic Basement

Jurassic (150–205 million years ago [Ma]) and Cretaceous (70–150 Ma) rocks form the basement complex and consist largely of metamorphic rocks, plutonic granites, and granodiorites. These impermeable basement rocks are visible in the northeastern portion of the Sierra Valley watershed surrounding Little Last Chance Creek and in the southwestern portion of the watershed forming the western margin of the Mohawk Valley Fault. They are also thought to underlie the more recent Tertiary volcanic material of the Dixie Mountain and Loyalton Volcanoes, discussed below.

The metavolcanic and metasedimentary rocks of the region are thought to represent remnants of a Jurassic island arc system (Grose 2000a, cited in SVRCD 2005). which are accreted to the North American Continent and subsequently intruded by plutons of quartz diorite and granite. The rocks are generally massive and crystalline. and form rounded outcrops intruded by granitic pegmatite dikes (DWR 1983, cited in SVRCD 2005).

Tertiary Volcanic

Much younger volcanic deposits, which rest upon the Mesozoic basement rocks that began to develop nearly 10 Ma (Grose 2000b, cited in SVRCD 2005), are present throughout the watershed. They consist largely of silicic tuffs and andesitic and dacitic flows and tuffs that rest on the older metavolcanic and granitic basement rocks. Examples of volcanic rocks can be found along the valley foothills, or appear as isolated buttes and low hills in



Source: SVRCD 2005

Geology of Sierra Valley **Exhibit 3.1-1**

the valley and in prominent areas such as the Antelope Valley volcanic center south of Loyalton, Loyalton volcanic center east of Loyalton, and the Sardine Peak complex located approximately 9 miles due south of the Loyalton volcanic center.

Volcanic material of the Sierra Valley can be generally divided into four groups: (1) late Oligocene to early Miocene silicic tuffs, (2) mid-Miocene andesitic flows and tuffs derived from local sources, (3) mid-Miocene dacitic to andesitic flows, and (4) tuffs from the Antelope Valley volcanic center (Grose 2000c, cited in SVRCD 2005).

Quaternary Sediments

Sediments that make up the gently sloping foothills and valley floor are derived from a variety of sources including inflowing streams, deposits from the Sierra Valley Lake, glacial till, and volcanic eruptions. Volcanic deposits include volcanic fanglomerates, conglomerated sandstones and mudstones, tuff and tuff breccias, mudflow breccias, and ignimbrite series (Durrell 1966, cited in SVRCD 2005). These sediments were likely deposited in a lenticular fashion coarsening radially outward near the margins of the valley.

FAULTING

The Sierra Valley lies among one of the most geologically faulted regions in California. Three primary faults Grizzly Valley Fault, Hot Springs Fault, and Mohawk Valley Fault, trend northwest and are suspected to dissect the watershed.

Grizzly Valley Fault

Grizzly Valley Fault can be traced from Mapes Canyon north of Beckwourth, extending along Smithneck Creek until it goes to Sardine Valley. The fault zone is approximately 10 miles long and 1–2 miles wide. Movement along the fault zone consists of left lateral high-angle normal faults of which a small right-slip component of movement is suspected (Grose 2000b, cited in SVRCD 2005).

Hot Springs Fault

Hot Springs Fault parallels Grizzly Valley Fault and can be traced southwest from Beckwourth to where it intersects the Grizzly Valley Fault approximately 1 mile north of Sardine Valley. This fault's name refers to the hot spring well and other thermal artesian wells located along this trace.

Mohawk Valley Fault

Mohawk Valley Fault trends northwest and is located throughout the Mohawk and Sierra Valleys southeast through Sierraville. The fault is a high-angle normal fault with occurrences of dextral-divergent movement. Vertical offset is estimated to be from 1,640 to 3,870 feet (Sawyer 1995, cited in SVRCD 2005).

It is suspected that many of the normal faults have fractured the underlying basement rocks resulting in substantial variations in the depths of valley sediments. Some estimates are from 800 feet below ground surface (bgs) up to 2,000 feet bgs (DWR 1963, cited in SVRCD 2005).

3.1.2 SOILS

Primary soils data available for the Antelope Valley and Smithneck Creek Wildlife Areas include:

- Soil Survey of the Sierra Valley Area, California, Parts of Sierra, Plumas, and Lassen Counties (NRCS 2007a)
- Soil Survey of the Tahoe National Forest (NRCS 2007b)

A brief description of common soil series present throughout the watershed is included below (NRCS 2007c). A summary of the soil types present within the wildlife areas is included in Table 3.1-1, Exhibit 3.1-2a, and Exhibit 3.1-2b. Soils within AVWA and SCWA consist of volcanic loams that are moderately deep and somewhat excessively drained. Small isolated rock outcroppings of metamorphic origin can be noted across portions of AVWA and SCWA. With these exceptions, soils are moderately deep and productive (CAL FIRE 1996).

Table 3.1-1
Soil Types within Antelope Valley and Smithneck Creek Wildlife Areas

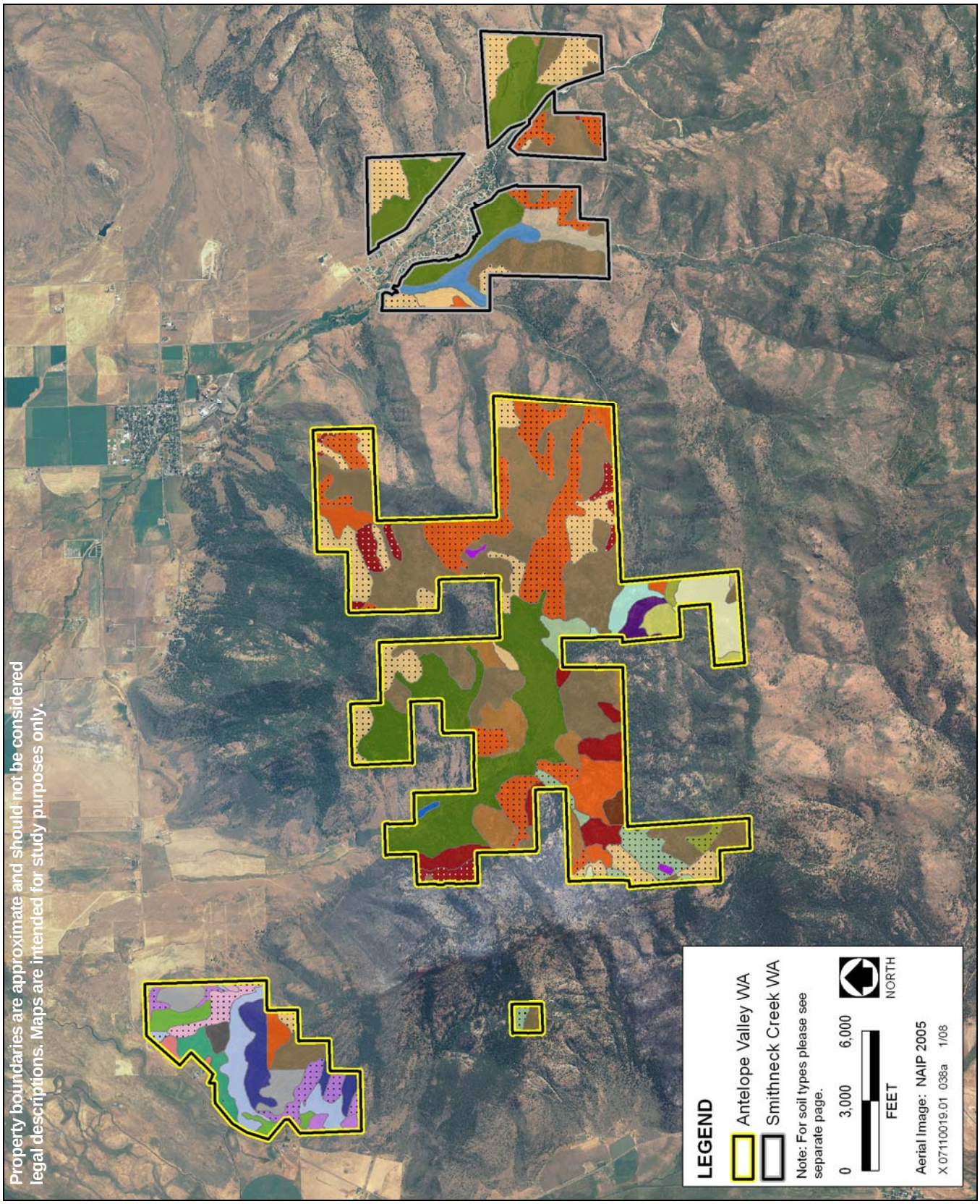
Acidic Rock Land	Aldax-Millich complex, 30–75% slopes
Aldax-Millich complex, 5–30% slopes	Aldax-Aquolls-Kyburz complex, 2–9% slopes
Aldi-Kyburz complex, 2–30% slopes	Aldi-Kyburz-Rock Outcrop complex, 30–75% slopes
Aquolls and Borolls, 0–5% slopes	Badenaugh very cobbly sandy loam, 2–30% slopes
Badenaugh-Martineck-Dotta association, 2–30% slopes	Balman-Ramelli complex, 0–2% slopes
Coolbrith silt loam, 0–2% slopes	Correco sandy loam, 2–5% slopes
Correco sandy loam, 5–15% slopes	Dotta cobbly sandy loam, 2–30% slopes
Dotta sandy loam, 2–9% slopes	Franktown-Aldi-Rock Outcrop complex, 2–30% slopes
Franktown-Aldi-Rock Outcrop complex, 30–50% slopes	Fugawee sandy loam, 2–30% slopes
Fugawee sandy loam, 30–50% slopes	Fugawee variant-Fugawee complex, 2–30% slopes
Fugawee variant-Fugawee-Rock Outcrop complex, 30–75% slopes	Fugawee-Tahoma complex, 30–50% slopes
Kyburz-Aldi complex, 2–30% slopes	Kyburz-Aldi complex, 30–50% slopes
Kyburz-Rock Outcrop-Trojan complex, 2–30% slopes	Kyburz-Trojan complex, 30–50% slopes
Kyburz-Trojan complex, 9–30% slope	Mariposa-Jocal complex, 2–30% slopes
Ramelli clay	Riverwash
Rock Outcrop, volcanic	Rock Outcrop-Franktown-Kyburz complex, 50–75% slopes
Trojan stony sandy loam, 30–50% slopes	Trojan-Sattley-Cryumbrepts, wet complex, 2–30% slopes
Trojan-Sattley-Kyburz complex, 2–30% slopes	Trojan-Sattley-Kyburz complex, 30–50% slopes
Source: NRCS 2007a and NRCS 2007b	

ALDAX SERIES

The Aldax series consists of shallow, well-drained soils that formed from material weathered from andesite or basalt. These soils are loamy-skeletal, mixed, superactive, mesic Lithic Haploxerolls. The Aldax soils are on uplands with slopes of 4 to 75%, and elevations ranging from 5,000 to 8,000 feet. The climate is semiarid with warm, dry summers and moist, cold winters. The mean annual precipitation is 12 to 18 inches and the mean annual air temperature is about 47°F. Permeability is moderately rapid in the Aldax soil. Runoff is medium to rapid. The Aldax series supports big sagebrush, bitterbrush, bluegrass, cheatgrass, squirreltail, and rabbitbrush with scattered pinyon pine and juniper.

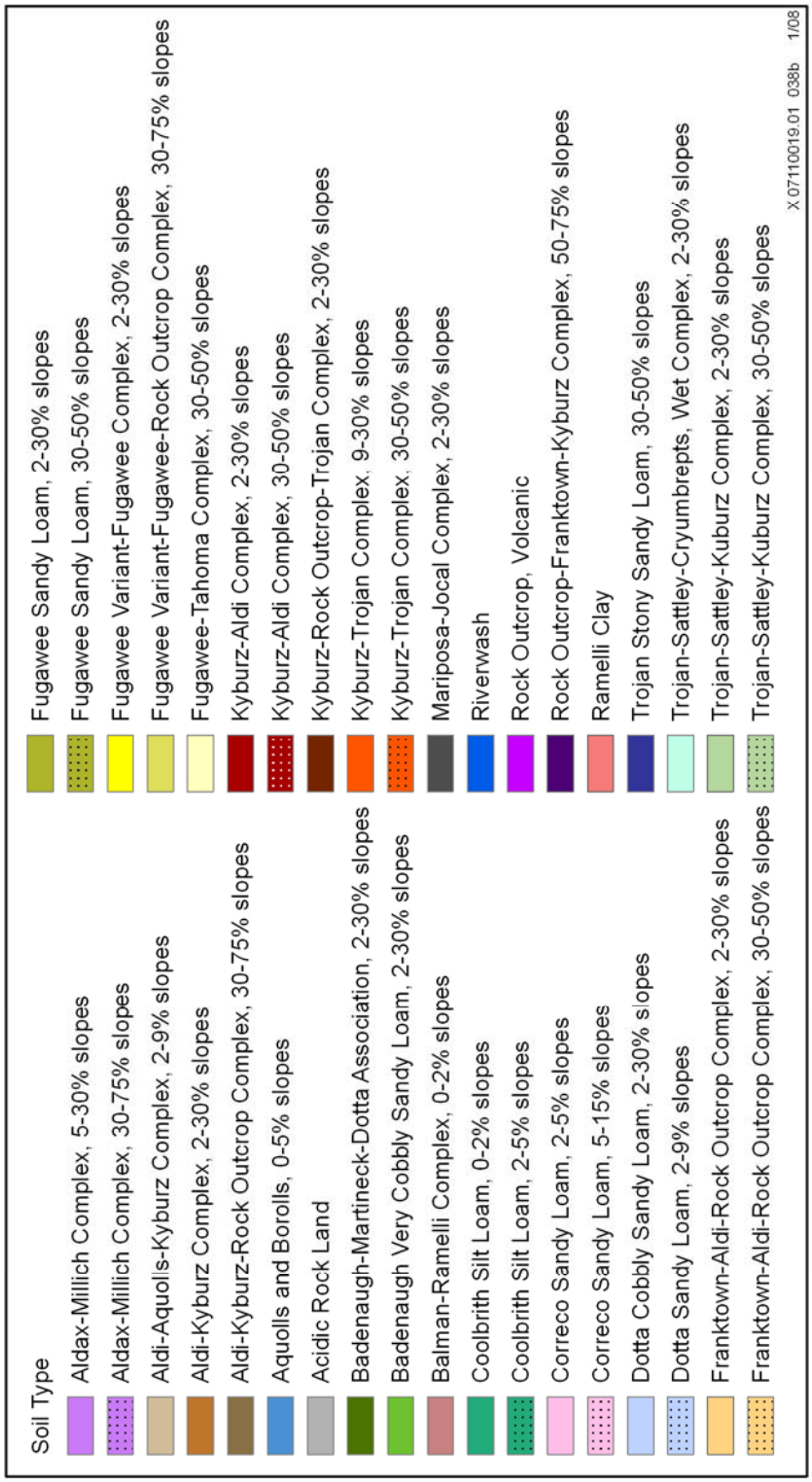
ALDI SERIES

The Aldi series consists of shallow, well-drained soils formed in material weathered from volcano rock. These soils are clayey, smectitic, frigid Lithic Ultic Argixerolls. Aldi soils are on gently sloping valley floors and moderately steep to steep mountainside slopes at elevations of 5,000 to 6,500 feet. Slope ranges from 2 to 75%. The mean annual precipitation varies from 15 to 35 inches and the mean annual temperature varies from 43 to 47°F. Permeability is slow and runoff is medium. Principal species are bitterbrush, sagebrush, annual and perennial grasses.



Source: NRCS 2007a, NRCS 2007b

Soils Within the Antelope Valley and Smithneck Creek Wildlife Areas **Exhibit 3.1-2a**



Source: NRCS 2007a, NRCS 2007b

Soils Legend **Exhibit 3.1-2b**

AQUOLLS

Mollisols that are saturated with water for long periods eventually have limited use for most crops, other than for pasture, unless they are artificially drained. Aquolls (a suborder in the U.S. system of soil taxonomy) may have a histic epipedon, a sodium saturation in the upper part of the mollic epipedon, of >15% that decreases with depth or mottles or turns gray within or immediately below the mollic epipedon.

BADENAUGH SERIES

The Badenaugh series are loamy-skeletal, mixed, superactive, mesic Aridic Argixerolls. The series consists of very deep, well-drained soils that form in alluvium derived from mixed igneous rocks. Badenaugh soils are on fan remnants and stream terraces. Slopes are 2 to 30% and elevation ranges from 4,000 to 6,000 feet. The climate is semiarid with cool, moist winters and warm, dry summers. The mean annual precipitation is 10 to 16 inches and the mean annual temperature is 46 to 50°F. Permeability is moderate or moderately slow with medium or high surface runoff. The vegetation is mainly mountain big sagebrush, antelope bitterbrush, Indian ricegrass, Thurber's needlegrass, and scattered western juniper.

BASIC ROCK LAND

The Basic Rock Land consists of rough, rocky terrain. Rock outcrops and very shallow soils cover as much as 50 to 90% of the surface. These rocks are primarily found in the foothills and steep mountainous terrain. The rock consists primarily of volcanics. The vegetation is spotty cover of sagebrush, annual and perennial grasses, and minor stands of timber.

BOROLLS

Borolls are cold climate mollisols. They formed in areas with annual soil temperature less than 46°F, and a long wet season (i.e., never dry for 60 consecutive days or more within the 90 days following the summer solstice). They do not contain material with a calcium carbonate equivalent greater than 400 grams per kilogram (unless they have a calcic horizon) and their use for most crops is not limited by the period of soil saturation.

DOTTA SERIES

The Dotta series consists of very deep, well-drained soils that formed from alluvium weathered from metamorphic and igneous rock sources. They are on alluvial fans and terraces. Dotta soils are fine-loamy, mixed, superactive, mesic Pachic Argixerolls. Slopes are 0 to 30% and elevation ranges are 2,000 to 5,500 feet. The mean annual precipitation is 12 to 25 inches and mean annual temperature is 47 to 52°F. Runoff is rapid to slow and permeability is moderate to moderately slow. Vegetation is Idaho fescue, bluebunch wheatgrass, bearless wheatgrass, and big sagebrush.

FRANKTOWN SERIES

The Franktown series consists of very shallow and shallow, somewhat excessively drained soils that formed in rediduum and colluvium derived from metamorphic rocks. Franktown soils are loamy-skeletal, mixed, superactive, frigid Lithic Ultic Haploxerolls. This soil occurs on mountains and typically occurs on backslope positions. Elevations range from 5,200 to 8,000 feet at slopes of 45 to 80%. Mean annual precipitation is 16 to 30 inches and mean annual temperature is 41 to 45°F. Franktown soils have very high surface runoff and moderately rapid permeability. The vegetation is principally Jeffery pine in small groves or as scattered trees with an understory of mountain big sagebrush, antelope bitterbrush, serviceberry, snowberry, bluegrass, needlegrass, buckwheat, and curlleaf mountain mahogany.

KYBURZ SERIES

The Kyburz series consists of moderately deep, well-drained soils formed in material weathered from basic volcanic rock. Soils are fine-loamy, mixed, active, frigid Ultic Haploxeralfs. Kyburz soils are on gently sloping plateaus and moderately steep to steep mountain slopes at elevations of 5,500 to 6,400 feet. Slopes range from 2 to 50%. The mean annual precipitation is 18 to 35 inches and the mean annual temperature is 43 to 47°F. Soils have slow to rapid runoff and moderate to moderately slow permeability. Principal species are Jeffery pine and ponderosa pine.

MARTINECK SERIES

The Martineck series is a member of the clayey-skeletal, smectitic, mesic, shallow family of Aridic Duixerolls. These soils are gently sloping to moderately steep and are on undulating to hilly terraces at elevations of 4,500 to 5,200 feet. The mean annual precipitation is 12 to 18 inches and mean annual temperature is 48°F. Martineck soils have slow to rapid runoff and very slow permeability. The vegetation is low sagebrush, bitterbrush, and perennial grasses.

MILLICH SERIES

The Millich series consists of shallow, well-drained soils that formed in residuum and colluvium derived from volcanic rocks. Soils are clayey, smectitic, frigid Lithic Argixerolls. Millich soils are on hills with slopes 5 to 60% and elevations from 5,400 to 6,500 feet. The mean annual precipitation is 12 to 18 inches and the mean annual temperature is 45 to 49°F. Surface runoff is very high and permeability is slow. The vegetation is antelope bitterbrush, low sagebrush, mountain big sagebrush, needlegrass, bottlebrush squirreltail, singleleaf pinyon, and widely spaced Jeffery pine.

TROJAN SERIES

The Trojan series consists of deep and very deep, well-drained soils that formed in colluvium and residuum derived from volcanic rocks or from schist and argillite. Soils are fine-loamy, isotic, frigid Ultic Argixerolls. Trojan soils are on hills and mountains. Slopes are 2 to 50% and elevation ranges from 4,900 to 6,500 feet. The mean annual precipitation is 16 to 28 inches and the mean annual temperature is 39 to 47°F. Trojan soils have moderately slow permeability and medium or high surface runoff. The vegetation is an open forest canopy of Jeffery pine and ponderosa pine with an understory of antelope bitterbrush, curlleaf mountain mahogany, mountain big sagebrush, and scattered western juniper.

EROSION HAZARDS

Four parameters—soil, slope, cover, and climate—are considered when evaluating erosion hazards. Soil must be analyzed for detachability and permeability. Slope must be viewed for uniformity and steepness. Cover is important because of the density of both living and dead vegetation that shields the soil from erosion by raindrops. Climate is important in determining erosion hazards. The distribution of annual precipitation, intensity of storms, distribution of snowfall and snowmelt, and the freezing of the ground surface affect erosion. Together these parameters provide a general sense of the potential for soils to erode. Soils are designated as a “slight,” “moderate,” or “high” erosion hazard.

Environmental conditions in both AVWA and SCWA make these ecosystems susceptible to erosion, as evidenced by the incised conditions of Antelope Valley Creek and Bear Valley Creek (see Appendix D). In addition, both wildlife areas have experienced surface soil erosion problems during storm events following large fires. After the Harding fire (see Chapter 3.6 Fire and Timber Harvest), which burned much of the vegetative cover protecting surface soils on steep slopes in AVWA, a large storm event quickly released several inches of rain onto these exposed slopes. Large amounts of sediment and debris were washed down these slopes into channels and tributaries in Antelope Valley below.

3.1.3 TOPOGRAPHY

AVWA and SCWA lie on the southeast edge of the Sierra Valley watershed. The topography of the Sierra Valley watershed is typical of former lake basins. A large portion of the watershed's 297,000 acres is part of the valley floor. The low gradient of the valley floor is a result of the Pleistocene lake that once occupied the valley. During this time, an abundance of glaciers could be found throughout the Sierra Nevada. Traces of these glaciers are found within the watershed today. The steep slopes of the surrounding Sierra Nevada still drain into the Sierra Valley, but now become the headwaters of the Middle Fork Feather River. The topography is moderately steep, 30–70%, with incised canyons exceeding 75% (CAL FIRE 1996).

ELEVATION

Elevation within AVWA ranges from 5,000 feet at the valley floor to 6,800 feet in the surrounding mountains. The SCWA elevation ranges from 5,200 to 6,000 feet (Department 1990). Loyalton sits at 4,985 above mean sea level (msl). The U.S. Geological Survey (USGS) 7.5-foot quadrangle maps within the wildlife areas are Antelope Valley, Sierraville, Loyalton, and Sardine Peak. Watershed topography with elevation bands is shown in Exhibit 3.1-3.

3.1.4 CLIMATE

Climate data is based primarily on information provided in the Sierra Valley Watershed Assessment (SVRCD 2005).

TEMPERATURE AND GROWING SEASONS

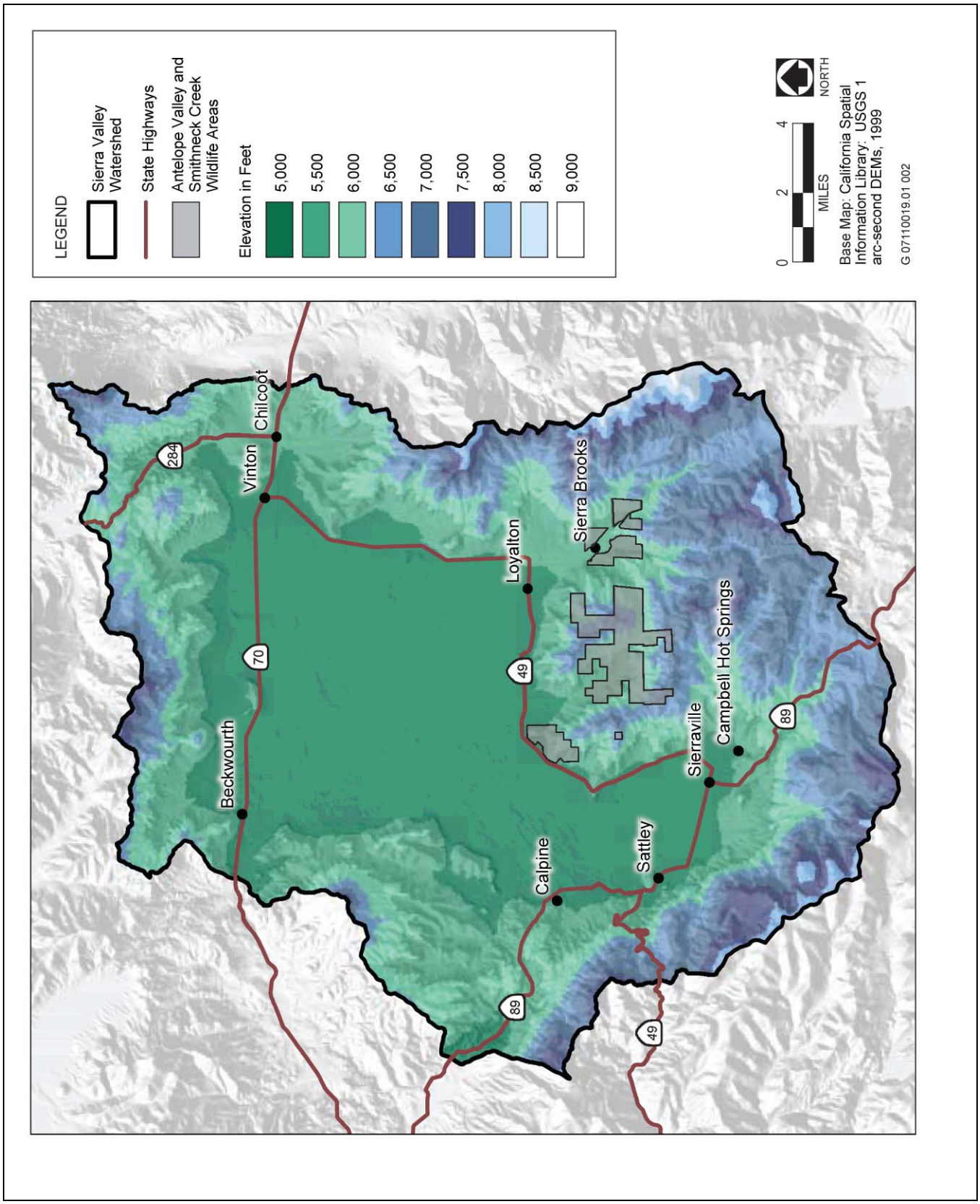
Average annual temperatures within the Sierra Valley watershed range from a low of approximately 30ºF to a high of 63ºF. Temperatures are typically warm in the summer months with average maximum monthly temperatures occurring in July at approximately 84ºF in Sierraville. Temperatures ranging from the high 70ºFs to the mid-80ºFs are common from June through September. Maximum temperatures have been recorded in August at 104ºF in Sierraville.

Temperatures in winter months average 30ºF in Sierraville. Maximum temperatures from December through February range from the low to mid-40ºFs throughout the watershed. The lowest recorded temperature in Sierraville was -29ºF on December 9, 1972.

The first fall freeze generally occurs in September in Sierraville and on the rest of the valley floor. May is generally the last month of freezing temperatures. At higher elevations in the watershed, it is not uncommon to experience freezing temperatures throughout the year.

During January, Sierraville experiences daily temperature fluctuations of approximately 30ºF. In July, temperatures fluctuate nearly 40ºF.

Evaporation is the amount of water lost from a system. The sun's radiation, air temperature, wind speed, and vapor pressure (relative humidity) cause evaporation. Evaporation data, although typically used to schedule irrigation events, closely reflect the evaporation rates of surface water and are used to help calculate water balance of the watershed. Data (DWR 1979, cited in SVRCD 2005) indicate the average evaporation rates from 1960 to 1970 for the area around Vinton (approximately 10 miles north of the wildlife areas) (see Table 3.1-2). Although these are the only evaporation data available for the watershed it is assumed that the evaporation rates would be similar for the rest of the valley floor.



Source: SVRCD 2005

Sierra Valley Elevations **Exhibit 3.1-3**

Table 3.1-2
Evaporation Rates (Inches) for Vinton: 1960–1970

Year	Total	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1960					44	49	106	228	215	266	267	283	206
1961		127	80	57				171	208	282	331	239	209
1962		141						180	166	203	225	247	206
1963		108	22					81	130	163	283	263	164
1964		117	35					137	169	187	257	259	212
1965		154							165	178	198	198	164
1966		134							208	232	279	252	188
1967		138								128	214	177	133
1968		98							225	289	349	243	223
1969									245	201	307	317	226
1970										214	321	321	
Mean	1,716	127	46	57	44	49	106	159	192	213	276	254	193

Source: DWR 1979, cited in SVRCD 2005

The growing season, based on freezing dates, is approximately 60–90 days on the valley floor. The growing season typically shortens considerably in the mountainous regions to the west and south of the valley.

PRECIPITATION

On average, most areas of the Sierra Valley watershed receive approximately 15 to 20 inches of precipitation per year. Most precipitation falls during the winter months with 77% of the annual total falling between November and March. Monthly averages are highest in January with 4.59 inches falling in Sierraville and 4.17 inches falling in Portola. Rainfall during the summer months is limited to thundershowers 5 to 10 days per year, accounting for less than 5% of the annual precipitation. Precipitation not only feeds the creeks and rivers of the region, but recharges the groundwater resource as well.

Average total precipitation recorded at the USFS Sierraville Ranger Station between 1997 and 2007 are shown in Table 3.1-3. The Sierraville Ranger Station data were collected at an elevation of 4,975 feet in the Feather River basin.

SNOWFALL

Snowfall data collected at the Sierraville Ranger Station (elevation 4,975 feet above msl) show January as having the highest average snowfall at approximately 17.9 inches with average annual snowfall of approximately 71.8 inches. The highest total annual snowfall recorded at the Sierraville Ranger Station was 242.3 inches in 1952.

In this high elevation valley, snow tends to stay on the ground for long periods. In January, the average snow depth in Sierraville is 5 to 6 inches, with snow depths consistently above 2 inches from December to April.

Table 3.1-3
Average Total Precipitation (Inches) for the Sierraville Ranger Station: 1997–2007

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
1997	12.21	0.45	0.40	0.61	0.06	1.32	0.00	0.00	0.36	1.62	2.25	1.80	21.08
1998	5.38	7.09	3.88	1.67	1.81	0.31	0.08	0.00	2.35	0.73	4.38	2.37	30.05
1999	5.99	8.87	2.64	1.88	0.00	0.12	0.00	0.82	0.37	1.75	1.58	0.74	24.76
2000	8.90	7.00	0.48	1.79	0.63	0.41	0.00	0.00	0.21	1.84	1.00	0.74	23.00
2001	0.88	1.88	1.82	1.91	0.00	0.00[a]	0.02	0.00	0.42	0.6	4.62	4.68	16.83
2002	1.60	1.18	2.37	0.98	0.38	0.05	0.11	0.00	0.00	0.00	6.10	7.19	19.96
2003	1.13	1.12	2.43	3.99	0.55	0.18	0.51	1.28	0.01	0.03	1.45	6.76	19.44
2004	1.63	6.45	1.13	0.08	0.69	0.25	0.00	0.01	0.31	2.91	2.54	2.69	18.69
2005	3.88	1.31	4.82	1.40	2.16	0.59	0.00	0.00	1.39	0.43	1.64	17.84	35.46
2006	3.92	4.72	4.18	6.25	0.31	0.18	0.00	0.00	0.00	0.15	1.59	1.86	23.16
2007	0.81	5.22	0.76	0.89	0.33	0.32	0.00	0.00	0.08	1.63	0.39	–	10.43[b]

Notes:
[a] Trace of Precipitation
[b] Excluding December
Source: DWR 2007.

3.2 WATER RESOURCES

3.2.1 HYDROLOGY

SURFACE WATER

The AVWA and SCWA lie within the Sierra Valley Hydrographic Unit (Sierra Valley unit), which is part of the Middle Fork Feather River Hydrologic Unit (HUC 18020123) of the Central Valley Drainage Basin, in northeastern Sierra County. The approximate boundaries of the Sierra Valley unit are Plumas County in the north, the Sierra crest in the west, a line passing through Babbitt and Sardine Peaks to Henness Pass in the south, and Mount Ina Coolbrith and the Bald Mountains in the east (Sierra County 1996).

The Sierra Valley unit drains the streams originating in the mountains surrounding the Sierra Valley to the middle fork of the Feather River near Beckwourth in Plumas County. The Feather River flows westward into the Sacramento River in the Central Valley (Sierra County 1996).

A number of streams and creeks flow through AVWA and SCWA into the Sierra Valley. The major features are Antelope Valley, Smithneck, Bear Valley, and Badenaugh Creeks (Exhibit 2-1). Antelope Valley, Bear Valley, and Smithneck Creeks flow into the valley from the south. Smithneck Creek has an average annual flow of 8,076 acre-feet per year and a drainage area of 31.6 square miles (DWR 1973, cited in Chapter 8 of Sierra County 1996). Badenaugh Creek flows into the Sierra Valley from the east and originates on the west side of Babbitt Peak. See Section 3.3, "Biological Resources," and the restoration project description in Appendix D for site-specific descriptions of the main creeks located in the wildlife areas.

GROUNDWATER

The Sierra Valley Groundwater Basin (SVGWB) extends from the southern edge of the Sierra Valley in Sierra County into Plumas County to the north. SCWA lies above the southeastern portion of the SVGWB and the AVWA lies just outside the southern boundary. Although the AVWA does not lie directly above the SVGWB, it is assumed that its surface waters contribute to the recharge of the groundwater basin. The groundwater basin consists of younger alluvium, lake, and volcanic deposits of the Valley floor. Unconfined groundwater within the SVGWB is generally found less than 100 feet deep and movement is to the north. Confined aquifers between depths of 100 and 2,000 feet contain a large volume of groundwater (Sierra County 1996).

Recharge of the groundwater occurs by infiltration of surface waters through permeable materials in the upper portions of the alluvial fans on the edge of the Sierra Valley. Some recharge occurs from direct precipitation into the higher elevation volcanic rocks, infiltration of precipitation into the Valley floor, and percolation of irrigated water. It is approximated that the groundwater storage capacity is 2,500,000 acre-feet for the Sierra County portion of the SVGWB (Sierra County 1996).

3.2.2 WATER QUALITY

OVERVIEW

Human use has greatly altered the Feather River watershed, including the creeks located within the wildlife areas. Past mining, grazing, and timber harvest practices; wildfires; and railroad and road construction have resulted in accelerated erosion, degraded water quality, decreased vegetation and soil productivity, and degraded terrestrial and aquatic habitats. Long-term vegetation disturbance and gully erosion has led to a dramatic change in hydrology, leading to reduced summer flow, higher summer water temperature, lower water tables, reduced meadow storage capacity, and a trend from perennial to intermittent flow. Many downcut streams no longer sustain late-season flow, causing adverse effects on riparian and upland vegetation, aquatic communities, and downstream water uses (FRCRM 2008a).

The Feather River Watershed Coordinated Resource Management (FRCRM) Watershed Monitoring Program summarizes water quality data from numerous sites in the Feather River Watershed. The closest sampling location to the wildlife areas is located at Beckwourth in the Middle Fork Feather River watershed. The 2004 FRCRM Watershed Monitoring Program report indicated that at the Beckwourth station pebbles coarsened and that the channel was gradually increasing in entrenchment (i.e., gullies). It had the highest total dissolved solids and electrical conductivity of all reported sites, and was five times higher in phosphorus than the next highest site. It also had the highest concentration of ammonia, aluminum, cadmium, chromium, iron, lead, and zinc (FRCRM 2004a).

The *Watershed Assessment Report—Antelope Valley Watershed and Watershed of an Unnamed Tributary to Bear Valley Creek* (Appendix D) states that the stream channel system of the Antelope Valley watershed is severely degraded. It describes "stream channel degradation and development of entrenchments (aka gullies)" …"as a result of stream channel relocation and channelization during the early logging era, construction and relocation of Antelope Valley Road, and construction of Palen Reservoir and a system of diversion ditches. The stream system continues to degrade today and the entrenchments that have developed continue to widen (actively erode), reducing and dewatering adjacent meadows and other landscape features."

The 1977 Sierra County General Plan Wildlife Element identified several streams degraded by sediment. Stream ratings focused on habitat deterioration. Antelope Valley Creek was classified as severely degraded with highly erosive soils. The condition of Smithneck Creek was categorized as substantially altered with stream channelization or bank alteration and surrounding fragile meadows and riparian vegetation (Sierra County 1977, as cited in Chapter 8 of Sierra County 1996). While this stream inventory is not recent (1977), it provides a broad indication of current conditions and it indicates that stream degradation has been an ongoing problem for decades. The conditions of some creeks may have worsened, and it does not appear that conditions have substantially improved.

It is anticipated that the proposed watershed restoration activities would substantially improve water quality, as it relates to erosion and sedimentation, by reconnecting entrenched creeks in the wildlife areas with their floodplains. These floodplains are essential buffers, absorbing the impacts of high flow events and high nutrient and sediment discharges. They absorb water during the wet season and release much of this captured water during the dry season. Stream channels downstream of proposed watershed restoration activities would become more stable and show significantly improved water quality conditions (Benoit, pers. comm., 2007).

BENEFICIAL USES

In California, beneficial uses of a water feature are legally designated by the Regional Water Quality Control Board (RWQCB), in this case the Central Valley RWQCB. They are described in the Sacramento–San Joaquin River Basin Plan (Basin Plan) (Rooney and Schnabel 1998). Beneficial Use designations determine applicable water quality objectives. The Basin Plan does not identify beneficial uses specific to any of the creeks located within the wildlife areas; however, they are the same as those indicated for other water features in the Sierra Valley. The Beneficial Uses designations for waters in the Sierra Valley are (SVRCD 2005):

- Agriculture,
- Recreation Contact and Other Noncontact,
- Freshwater Habitat,
- Spawning, and
- Wildlife Habitat.

3.2.3 WATER RIGHTS

RIPARIAN WATER RIGHTS

No California statute defines riparian rights, but court decisions have established a common law doctrine of riparian rights that has been confirmed by the provisions of Section 3, Article XIV of the California Constitution (California Water Code Sections 100, 101).

In general, riparian lands are those that are traversed by or border a natural watercourse. A riparian right enables an owner of land bordering a natural watercourse to take and use water on his riparian land. Each owner may have a right, correlative with the right of each other riparian owner, to share in the reasonable beneficial use of the natural flow of water that passes his land.

The State Water Resources Control Board (SWRCB) considers natural flow as not including return flows derived from use of groundwater, water seasonally stored and later released, or water diverted from another watershed. Riparian rights may be used to divert the natural flow of a stream but may not be used to store water for more than 30 days or divert water released from storage. Riparian land must be in the same watershed as the water source and must never have been severed from the source of supply by an intervening parcel without reservation of the riparian right to the severed parcel. No permit is required for use of riparian rights. A record of water use under riparian claim can be established by filing a Statement of Water Diversion and Use with the SWRCB (SWRCB 2000).

APPROPRIATIVE WATER RIGHTS

An appropriative right is required for use of water on nonriparian land and for storage of water. Generally, appropriative rights may be exercised only when there is a surplus not needed by riparian water users.

Before 1872, appropriative water rights could be acquired by simply taking and beneficially using water. In 1872, Sections 1410 through 1422 of the California Civil Code were enacted, which established a procedure for the appropriation of water. A priority of right was established by posting a notice of appropriation at the proposed point of diversion and by recording a copy of the notice with the respective County Recorder.

Appropriative rights initiated after December 19, 1914, the effective date of the California Water Commission Act, require a permit from the state (California Water Code. Section 1225) and compliance with the provisions of Division 2, Part 2 of the California Water Code. The California Code of Regulations, Title 23, Waters, contains regulations for the administration of water rights and water quality activities of the SWRCB.

Once acquired, an appropriative right can be maintained only by continuous beneficial use of water. The amount that now can be rightfully claimed under an appropriative right initiated before December 19, 1914, has, in general, become fixed by actual beneficial use as to both amount and season of diversion. Successful assertion of an appropriative right that was initiated before December 19, 1914, requires evidence of both the original appropriation and the subsequent maintenance of the right by continuous and diligent application of water to beneficial use (California Water Code Section 1202 [b]). Typically appropriative water rights will be lost after 5 years of nonuse.

A right secured by appropriation is subordinate to all prior vested rights. This limitation may be removed by continuous use adverse to prior rights for 5 years if the owners of the prior rights fail to file legal action to protect themselves during that time. This result is called a prescriptive right to the use of water. A well-established rule is that a prescriptive water right ordinarily cannot be acquired against an upstream user (SWRCB 2000).

In 1924, following many injuries and some deaths resulting from disputes over adjudicated water rights, the State of California established the Watermaster program to provide for general public welfare and safety. The main purpose of the Watermaster program is to ensure water is allocated according to established water rights as determined by court adjudications or agreements by an unbiased, qualified person, thereby reducing water rights court litigation, civil lawsuits, and law enforcement workload. It also helps prevent the waste or unreasonable use of water (DWR 2007).

WATER RIGHTS AT AVWA AND SCWA

In 2002 the Department filed a Statement of Water Diversion and Use with the SWRCB, recording the use of riparian water rights along Antelope Valley Creek. This document states that all available water is used for the

purpose of "Development and maintenance of riparian habitat for fish and wildlife use" and describes 1980 as the "Year of first use (nearly as known)." (Appendix E)

There is a water storage diversion on Department property just upstream of the northern AVWA property boundary along Antelope Valley Creek. This diversion is permitted to the adjacent property owner, Frederick Balderston. This diversion allows a maximum of 126 acre-feet per year to be stored between November 1 and March 1 for the purpose of irrigation (Appendix E).

Bear Valley Creek, Smithneck Creek, and Badenaugh Creek in SCWA are part of an adjudicated watershed with appropriative water rights reserved and in use by several property owners, including the Department. In addition, the Department has riparian water rights along each of these stream reaches.

A 1940 Sierra Valley Decree 3095 (DWR 1940) describes water allocations for a number of creeks in the Sierra Valley region, including Antelope Valley Creek and Smithneck Creek. The portion of Antelope Valley Creek located on Department property in AVWA is not within the Watermaster Service Area for this decree (Scarborough 2007). However, all parcels of SCWA are within this Watermaster Service Area.

The Department owns a first-priority water right at SCWA (under the Decree Name "Clover Valley Lumber Co.") of 0.40 cfs for industrial or municipal use on 23.5 acres and another first-priority right (under the Decree Name "Laffrenchini, Mary C.") of 2.4 cfs for irrigation on 166.4 acres. According to Sierra Valley Decree 3095, use of the 0.40 cfs water right is subject to Schedule C (page 33, paragraph 52, line 16), and diversions must be directly applied to beneficial use (page 16, paragraph 24). Water can be diverted from points 77 and 78 for the 0.40 cfs water right and from points 79, 80, 84, 85, and 252 for the 2.4 cfs water right. Water can only be diverted during the March 1 through September 30 diversion season. These points can be seen on the Department of Water Resources tract maps 51 and 49 respectively, and on map sheet 4 of the middle fork of the Feather River (DWR n.d.). The entire decree can be found at http://www.nd.water.ca.gov/PPAs/Watermasters/ServiceAreas/SierraValley/index.cfm

WATERSHED RESTORATION AND WATER RIGHTS

Watershed restoration actions proposed along Bear Valley Creek would be conducted within an adjudicated watershed. As such, information must be provided to the Sierra Valley Watermaster demonstrating that any proposed restoration would not diminish or otherwise adversely affect the water supply of other water users holding appropriated water rights. This task has been identified as a "step-down action," a term used by the Department to describe an activity that is currently beyond the scope of the LMP (in this case, because of the protracted time frame required to address the issue) and will require additional effort following the preparation and adoption of the LMP.

Importantly, the watershed restoration projects proposed on both Antelope Valley Creek and Bear Valley Creek are anticipated to enhance stream flows (and quality) rather than diminish downstream water supply. Water moves rapidly through degraded water systems during the wet season, thus reducing the likelihood of full groundwater recharge. "Plug and pond" restoration projects dissipate stream flows during the wet season. These stream flows are redirected into historic, remnant channels where they can easily access the historic floodplains and increase groundwater recharge. More water is stored in the upper watershed areas during the wet season and; therefore, more water is available for base stream flows during the dry season. Water is retained during wet months (the flood season) and released during dry months (the irrigation season). Following "plug and pond" restoration, a water balance shows no change in the volume of water moving through the system, only in the timing (Benoit, pers. comm., 2007) and (FRCRM 2008b).

3.3 BIOLOGICAL RESOURCES

This section discusses common and sensitive biological resources including vegetation, wildlife, and fisheries and aquatic resources that occur or have potential to occur in AVWA and SCWA.

The following text was developed through a review of scientific literature and existing data sources, information obtained from Department and USFS personnel, and observations made during reconnaissance surveys. Information about documented occurrences, regional distributions, and habitat associations of key plant, wildlife, and fish species was obtained through these resources.

3.3.1 VEGETATION

The Sierra Valley watershed supports a rich flora because of its location near the convergence of the Great Basin, Sierra Nevada, and Cascade Range Regions. Plant species and assemblages that are commonly found in other parts of the Sierra Nevada are present here because of proximity to these neighboring regions, contributing to the floral diversity of the area. For instance, the watershed includes a unique extension of Modoc Plateau vegetation into the Sierra Nevada. The Modoc Plateau is a subregion of the Great Basin that supports many rare and endemic plant species. In addition, because the Sierra Valley is located at a low point in the crest of the Sierra, it supports plant species that are generally restricted to lower elevations west of the crest, such as black oak (*Quercus kelloggii*) (Department 2001).

Vegetation types present in the wildlife areas were mapped using aerial photograph interpretation with reconnaissance-level field verification (Exhibit 3.3-1), and are discussed below under "Riparian and Wetland Ecosystems" and "Upland Ecosystems." A list of these vegetation types, their respective acreage in the wildlife areas, and a crosswalk to three commonly used vegetation classification systems is provided in Table 3.3-1. A list plant species known to occur within the wildlife areas is provided in Appendix F.

RIPARIAN AND WETLAND ECOSYSTEMS

Riparian and wetland vegetation types present in AVWA consist primarily of willow scrub and wet meadow associated with Antelope Valley and Bear Valley creeks. Sporadic stands of aspen riparian forest also occur along these creeks and near springs or other moist sites on mountain slopes.

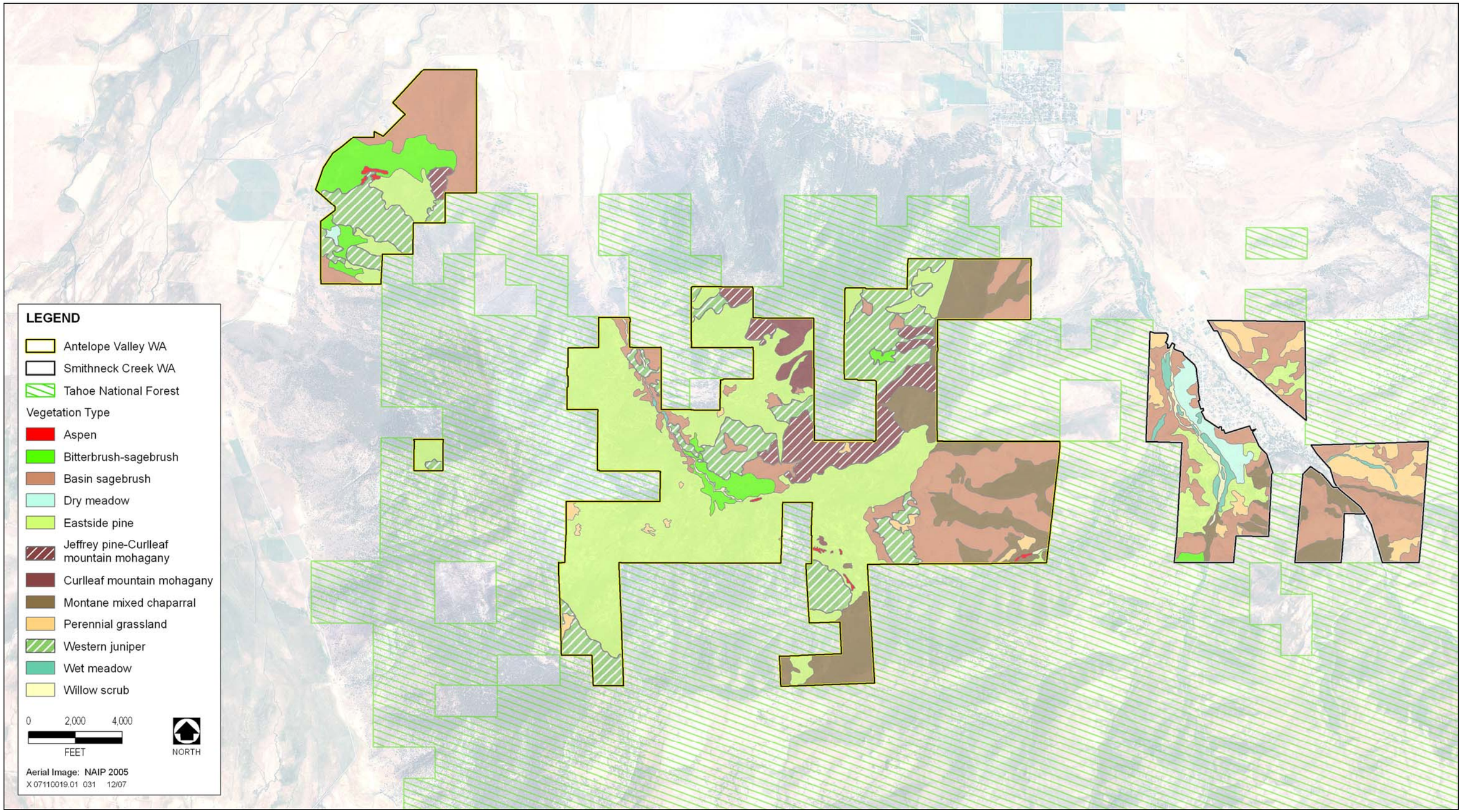
It is estimated that approximately 95% of California's wetlands and 75% of Nevada's wetlands have been lost to land conversion and hydrological modifications. Wetlands are the most imperiled ecosystem in the region (DFG 2001). The Sierra Valley watershed supports the largest remaining area of wetlands in the entire Sierra Nevada ecoregion (DFG 2001). Over half of the riparian habitat that once existed in the 48 conterminous states has been destroyed (Manci 1989) and estimates suggest that only 2–5% of the historic riparian habitat of interior California still exists (Riparian Habitat Joint Venture 2004). Much of the riparian habitat that remains both nationally and statewide is seriously degraded. Wetland and riparian habitat losses in the Sierra Valley watershed are primarily attributable to livestock grazing, agriculture, timber harvest, and stream modifications for water storage and supply and flood control. Riparian vegetation has been largely eliminated from the valley floor and has been substantially reduced in the wildlife area due to alterations to Antelope Valley Creek and Bear Valley Creek.

Alterations have resulted in disconnecting these creeks from their historic floodplains. Both creeks are now characterized by an increased bankfull width, an increased channel width to depth ratio, substantial channel incision (6-8 feet), reduced overbank flow frequency, and a lowered water table. The effect of these changes to both creeks is that riparian and wet meadow vegetation types have converted to dry meadow and sagebrush scrub types on the former floodplains, while wet meadow and riparian types are now restricted to narrow strips within the incised creek channels. As a result of downcutting, Antelope Valley Creek flows directly and rapidly to Palen Reservoir, rather than meandering slowly through its historic floodplain wet meadow surface, while recharging

groundwater reserves. A similar situation exists in Bear Valley Creek, which rapidly drains into Smithneck Creek through its deeply incised channel (see Appendix D for further discussion).

Riparian ecosystems provide food, water, migration and dispersal corridors, escape and thermal cover, and nesting habitat for wildlife (Mayer and Laudenslayer 1988). Riparian vegetation types generally support greater wildlife species richness and abundance than surrounding types, even when restricted to narrow corridors as they are in the Antelope Valley Wildlife Area. More than 225 species of birds, mammals, reptiles, and amphibians depend on California's riparian habitats and, while not dependent on them, many other species also make use of these habitats (Riparian Habitat Joint Venture 2004). Riparian areas provide some of the most important habitat for neotropical migrant landbirds that breed in or migrate through the western United States. These areas function as breeding habitat and important stopover areas during spring and fall migration. Loss and degradation of this habitat type may be the most important cause of declining landbird populations in western North America (Riparian Habitat Joint Venture 2004).

In addition to providing important habitat values to a variety of common and special-status species, riparian and wetland vegetation are part of the physical processes such as water movement and water table retention. The roots of riparian vegetation bind soil on stream banks stabilizing against cutting action. Riparian, marsh, and wet meadow vegetation dissipate stream energy during high flows, reducing erosion and improving water quality; filter and deposit sediment and capture bedload to aid floodplain development; promote prolonged base flows; and improve floodwater retention and groundwater recharge (Prichard 1998, Manci 1989). Riparian and wet meadow zones function as shallow aquifers that recharge during high flows and drain during low flows (Van Haveren and Jackson 1986 in Manci 1989). When the physical processes of riparian and wetland ecosystems are not functioning properly, these systems cannot sustain desired habitat values (Prichard 1998).



Source: EDAW 2007, DFG 2007, USFS 2006

Vegetation Types of the Antelope Valley and Smithneck Creek Wildlife Areas **Exhibit 3.3-1**

Table 3.3-1
Correspondence of Mapped Vegetation Types with Other Vegetation Classifications

Mapped Vegetation Type	Acres in Plan Area	Sawyer & Keeler-Wolf[1]	WHR[2]	Holland[3]
Herbaceous Wetland				
Wet meadow	53	Montane meadow habitat	Wet meadow	Great basin wet meadow
Riparian				
Willow scrub	46	Mixed willow series, montane wetland shrub habitat	Montane riparian	Modoc-great basin riparian scrub
Aspen riparian forest	15	Aspen series	Aspen	Aspen riparian forest
Herbaceous Upland				
Dry meadow	91		Perennial grassland	Montane meadow
Perennial grassland	291		Perennial grassland	Great basin grassland
Shrub Dominated Upland				
Big sagebrush scrub	1,641	Big sagebrush series	Sagebrush	Big sagebrush scrub
Bitterbrush-sagebrush scrub	323	Bitterbrush series, big sagebrush series	Bitterbrush, sagebrush	Great basin mixed scrub
Mixed montane chaparral	824	Tobacco brush series	Montane chaparral	Mixed montane chaparral, montane ceanothus chaparral
Tree Dominated Upland				
Curlleaf mountain mahogany woodland	81	Curlleaf mountain mahogany series	Montane chaparral	None
Jeffrey pine-curlleaf mountain mahogany woodland	328	Jeffrey pine series	Eastside pine	None
Western juniper woodland	860	Mountain juniper series	Juniper	Great basin juniper woodland and scrub
Eastside pine forest	2,426	Jeffrey pine series, ponderosa pine series	Eastside pine	Eastside ponderosa pine forest, Jeffrey pine forest

Notes: AVSC LMP = Antelope Valley-Smithneck Creek Land Management Plan; WHR = Wildlife Habitat Relationships.
1 Based on Sawyer and Keeler-Wolf 1995
2 Based on DFG 2002
3 Based on Holland 1986
Source: EDAW field survey in 2007

Wet Meadow

Small patches of wet meadow vegetation are found in willow scrub openings and understory along Antelope Valley Creek. Along Bear Valley Creek, wet meadow and willow scrub vegetation form a continuous corridor on the incised floodplain. The portion of Badenaugh Creek that runs through the wildlife area currently supports a narrow but continuous band of wet meadow vegetation. This vegetation type is characterized by dense perennial herb cover up to 5 feet tall. Characteristic species include rushes (*Juncus* spp.), sedges (*Carex* spp.), common spike rush (*Eleocharis macrostachya*), common horsetail (*Equisetum arvense*), tufted hairgrass (*Deschampsia caespitosa*), timothy (*Phleum pratense*), Canada reedgrass (*Calamagrostis canadensis*), common yellow monkeyflower (*Mimulus guttatus*), and hedge nettle (*Stachys ajugoides*). Wet meadows in the high Sierra and Great Basin typically include willow stringers along stream channels. Growth and reproduction occur most actively during summer months because of rich soils and plentiful moisture. Species are dormant through winter. Wet meadows occur on fine-textured soils of intermittent and perennial stream terraces where the water table is at or near the surface so that soil in the root zone (i.e., upper 12 inches) is more or less continuously saturated. This vegetation type has been used extensively for livestock grazing throughout the Sierra Valley watershed and is often manipulated to encourage predominance of grasses over sedges (California Gap Analysis Project 2007).

This vegetation type is analogous to Holland's Great Basin wet meadow (Holland 1986), a sensitive natural community tracked in the California Natural Diversity Database (CNDDB).

Willow Scrub

Willow scrub is found on the constricted active floodplains of Antelope Valley Creek and Bear Valley Creek and is characterized mostly by dense shrubby willow thickets, but includes areas with more open willow shrub distribution. The willow scrub is interspersed with wet meadow vegetation and forms a fairly continuous band along the Bear Valley Creek corridor, but is discontinuous and extremely narrow on Antelope Valley Creek. Willow species present include arroyo willow (*Salix lasiolepis*), yellow willow (*Salix lutea*), and narrow-leaved willow (*Salix exigua*), and wild rose (*Rosa woodsii* var. *ultramontana*) is usually also a shrub component. The understory of, and openings within, this vegetation type consists of a mixture of grasses and forbs that are typical of wet meadow and riparian vegetation in the Great Basin, including Baltic rush (*Juncus balticus*), mountain nettle (*Urtica dioica* ssp. *holosericea*), California mugwort (*Artemisia douglasiana*), sedges, creeping wild rye (*Leymus triticoides*), and western marsh cudweed (*Gnaphalium palustre*). This vegetation type is characteristic of low, wet alluvial terraces of perennial and intermittent streams of the Modoc Plateau and Great Basin deserts and typically occurs as a narrow corridor within a larger wet meadow complex in a properly functioning system.

The willow scrub vegetation type is analogous to Holland's Modoc-Great Basin riparian scrub (Holland 1986), a sensitive natural community tracked in the CNDDB.

Aspen Riparian Forest

Aspen stands are relatively infrequent within the wildlife area, but small patches do occur along Antelope Valley Creek in the main Antelope Valley unit and on mountain slopes near springs and other moist sites in the main Antelope Valley unit and Merry-Go-Round Unit. This vegetation type is characterized by dense stands of quaking aspen (*Populus tremuloides*) with hydrophytic herbs, such as monkshood (*Aconitum columbianum*), common yellow monkeyflower, hedge nettle, common horsetail, and swordleaf rush (*Juncus ensifolius*), in the understory. Scattered shrubs, including willows, bitter cherry (*Prunus emarginata*), and wild rose are also often present. Encroachment of Jeffrey pine (*Pinus jeffreyi*), tobacco brush (*Ceanothus velutinus*), and big sagebrush (*Artemisia tridentata*) was observed in aspen riparian forest areas in the wildlife area. In some stands, willows make up a high percentage of the total cover, becoming almost codominant with aspen. Aspen riparian forest typically forms on relatively flat, slow-moving stream reaches in soils that are high in organic content and remain saturated throughout the growing season (Holland 1986).

Quaking aspen is a clonal tree that produces multiple shoots (i.e., sprouts) from its root system (Perala 1990). Following disturbances, such as logging or a canopy fire, the root system produces large numbers of shoots; this often results in a patch of forest (i.e., a stand) with a canopy composed almost entirely of aspen. Although individual shoots of aspen are relatively short lived (typically 80–120 yrs [Perala 1990; Shepperd et al. 2006]), aspen stands can persist for centuries through the repeated replacement of stems with new stems from the root system. The recruitment and persistence of new shoots depends on disturbances that create conditions suitable for the initiation and growth of new shoots and intervals between disturbances suitable for the survival and growth of shoots. In the absence of disturbance, conifers may establish and eventually overtop the shade-intolerant aspens, reducing their survival and regeneration as discussed below under "Disturbance Dynamics in Riparian Ecosystems."

Aspen riparian forest is a sensitive natural community that is tracked in the CNDDB.

DISTURBANCE DYNAMICS IN RIPARIAN ECOSYSTEMS

The composition and structure of riparian vegetation are closely related to disturbance and flow regimes. Fires and floods are important disturbances affecting riparian vegetation in the wildlife area. The shoots of quaking aspen and willow species are killed by fires of even low intensity; however, these species subsequently produce sprouts from the stem bases or roots. In contrast, conifer species that grow in riparian zones have shoots that low-intensity fires do not kill, but that do not produce new shoots from their stem base or roots if shoots are killed during high-intensity fires.

Flood events disturb vegetation by scour, burial, uprooting, and inundation (Malanson 1993, Mitsch and Gosselink 1993, Keddy 2000). The frequency and magnitude of these disturbances are related to a stream's flow regime and, within a stream corridor, these disturbances are more frequent and intense at lower elevations (i.e., nearer the stream channel) than at higher elevations.

Plants differ in their vulnerability to mortality during flood events based on their size and species. Seedlings are readily uprooted or killed by scour, burial, or prolonged inundation. In contrast, mature plants are rarely completely uprooted, and larger plants are difficult to bury completely or to completely inundate for prolonged periods during the growing season. Even mature plants of most species have shoots that are readily killed through abrasion by coarse sediment. However, many species (including willow species) will produce new above ground shoots from their stem bases or below ground shoots (i.e., rhizomes).

For successful recruitment, many riparian-associated plants depend on specific hydrologic events before, during, and immediately following their seed release periods. Many species, especially species that are small seeded and intolerant to shade, such as quaking aspen and willows, require establishment sites that are largely free of competition from existing vegetation. The erosion and deposition of sediment along stream channels and on floodplains creates such surfaces.

In the absence of fire and flood disturbance, conifers may establish within riparian areas. Conifers, particularly white fir, can tolerate and grow in the shade of riparian trees and shrubs and have a narrower crown and can reach much greater heights than quaking aspen or any of the willow species. Conifers can grow between or through the crowns of riparian trees and shrubs and overtop them. Because quaking aspen, like most riparian trees and shrubs, are intolerant of shade, their growth and survival are substantially reduced when conifers overtop them. Consequently, when conifers encroach in quaking aspen and willow stands in riparian areas, conifer cover increases and quaking aspen and willow cover decreases (Shepperd et al. 2006).

UPLAND ECOSYSTEMS

Dry Meadow

Dry meadow vegetation is found primarily adjacent to the east side of the willow scrub and wet meadow in the Bear Valley Creek Unit, but two small patches of this vegetation type are also present along Antelope Valley Creek. It is located in a higher landscape position than the willow scrub and wet meadow vegetation, where the water table is deeper and soils are drier. This type is generally transitional between the wet meadow and sagebrush scrub vegetation types and is characterized by a mixture of wetland and upland plant species, particularly grasses. Characteristic species include Great Basin wild rye (*Leymus cinereus*), mule's ears (*Wyethia mollis*), creeping wild rye, Canada reedgrass, Kentucky bluegrass (*Poa pratensis*), panicled willowherb (*Epilobium brachycarpum*), and shining pepperweed (*Lepidium nitidum*). Most of the area currently characterized by dry meadow vegetation could be restored to wet meadow through remedial actions to raise the water table.

This vegetation type is analogous to Holland's montane meadow (dry subtype) (Holland 1986), a sensitive natural community tracked in the CNDDB.

Perennial Grassland

Patches of perennial grassland vegetation occur on hill slopes in openings within the sagebrush scrub and eastside pine vegetation types. This is an open grassland dominated by perennial bunchgrasses up to 3 feet tall. Characteristic grasses include bottlebrush squirreltail (*Elymus elymoides*), one-sided bluegrass (*Poa secunda*), western needlegrass (*Achnatherum occidentale*), Indian ricegrass (*Achnatherum hymenoides*), and Idaho fescue (*Festuca idahoensis*). Various annual and perennial wildflower associates grow between the widely spaced clumps of grasses including such species as mule's ears, California balsamroot (*Balsamorhiza macrolepis*), dusty maidens (*Chaenactis douglasii* var. *douglasii*), large-flowered collomia (*Collomia grandiflora*), California poppy (*Eschscholzia californica*), silvery lupine (*Lupinus argenteus* var. *heterandra*) and Great Basin navarretia (*Navarretia intertexta* ssp. *propinqua*). Growth and flowering generally take place during late spring and early summer with plants becoming dormant, or reaching the end of their life cycles in the case of annuals, as summer progresses and moisture becomes scarce. Plants remain dormant through winter because of the cold temperatures of the region. This vegetation type is found on fine-textured soils that are damp or frozen at the surface during winter, moist in spring, and dry through summer and fall.

Pristine perennial grassland has become somewhat uncommon in the region because of the effects of grazing, which have caused many areas formerly covered with perennial grasses to become dominated by sagebrush and have also led to the introduction of invasive annuals, such as cheatgrass (*Bromus tectorum*), that displace native bunch grasses over time through their ability to outcompete natives for spring moisture. However, perennial grassland vegetation is still much more common in the Great Basin and eastern Sierra than in the Central Valley of California, where perennial grasslands have been almost completely replaced by introduced annual grasses. Note that not all grassland areas identified on the aerial photography were verified by a ground-level survey and it is possible that some of these sites are dominated by cheatgrass rather than native perennial grasses.

This vegetation type is analogous to Holland's Great Basin grassland community (Holland 1986), a sensitive natural community tracked in the CNDDB.

Big Sagebrush Scrub

Big sagebrush scrub is common in all units of the wildlife areas and is the second most common vegetation type after eastside pine. It occurs in valleys and on lower slopes between meadow and juniper vegetation types. It also occurs on the higher slopes in the eastside pine forests. It is found on a wide variety of soils and terrain, from rocky, well-drained slopes to fine-textured valley soils with a high water table (Holland 1986). In some areas, the lowered water table resulting from channelization and incision of Antelope Valley and Bear Valley Creeks has led

to expansion of sagebrush scrub vegetation into areas formerly occupied by wet meadow vegetation. This vegetation type is dominated by widely spaced big sagebrush shrubs, mostly 2–3 feet tall, and typically contains other, shorter soft woody shrubs including common rabbitbrush (*Chrysothamnus nauseosus*), Parry's rabbitbrush (*C. parryi*), sticky-leaved rabbitbrush (*C. viscidiflorus*), bitterbrush (*Purshia tridentata*), and gray horsebrush (*Tetradymia canescens*). The herb layer is generally sparse and includes species typical of perennial grassland. The active growing season for this vegetation type is late spring and early summer with a progression of flowering from species that bloom in late spring, such as bitterbrush, to others, such as sagebrush and rabbitbrush, that bloom in early fall.

Fire strongly influences the dynamics of sagebrush-dominated habitat. Sagebrush does not resprout after fire. Although some viable seed may survive a fire, sagebrush has relatively short-lived seed that are wind dispersed and generally do not travel far from the parent plant. Consequently, frequent fires often convert sagebrush-dominated areas to other vegetation types. Invasion by cheatgrass increases the continuity and quantity of fuels within sagebrush-dominated vegetation, and thus increases fire-induced sagebrush mortality and fire frequency (Young 2000). Both effects can substantially reduce the abundance of sagebrush. Cheatgrass is widespread and abundant within the Sierra Valley watershed. It was observed in open areas throughout the wildlife area, particularly in areas that burned during the Harding Fire.

Bitterbrush-Sagebrush Scrub

This moderately tall, open-canopied shrubland vegetation type is present in the main Antelope Valley unit and Merry-Go-Round Unit, where it intergrades with big sagebrush scrub. It is similar to the big sagebrush scrub type, but bitterbrush is codominant with sagebrush, rather than just an occasional associate. The bitterbrush forms a taller shrub layer, 5–10 feet tall, above the sagebrush and other shrubs. Like the big sagebrush scrub community, a number of soft-woody shrub species and perennial bunch grasses are present. Bitterbrush-sagebrush scrub grows on deep, gravelly, well-drained sites usually in alluvium derived from granitic sources and is generally found at slightly higher elevations and on more fertile soils than big sagebrush scrub (Holland 1986). Overgrazing can eventually eliminate bitterbrush from a site, causing conversion from a bitterbrush-sagebrush mixed scrub to big sagebrush scrub.

Bitterbrush is very susceptible to fire mortality and is a weak sprouter at best; sprouting ability is variable depending on ecotype, shrub age, fire intensity and season, soil texture, geographic location, and shrub morphology with decumbent forms sprouting more successfully than columnar forms (Zlatnik 1999). The seed bank generally survives even high intensity fires, though, and seed germination and growth is generally very successful on exposed mineral soils where competition has been reduced by fire. However, recovery of bitterbrush following fire generally takes 20 years or more (Zlatnik 1999), and as discussed previously for the big sagebrush scrub community, bitterbrush- sagebrush scrub may convert to other vegetation types in the presence of frequent fires.

Mixed Montane Chaparral

Mixed montane chaparral dominated by greenleaf manzanita (*Arctostaphylos patula*) and tobacco brush is the vegetation type on exposed slopes in the eastern portion of the main Antelope Valley unit that burned during the Cottonwood Fire of 1994. Smaller patches are also present in burned areas of the Badenaugh and Bear Valley Creek Units. In many areas, tobacco brush is dominant with greenleaf manzanita as an occasional associate. Mixed montane chaparral is a dense-canopied shrub type, up to 10 feet tall, with a sparse herbaceous layer. In the wildlife areas, it intergrades with big sagebrush scrub. Associated herb species observed in the wildlife areas include cheatgrass, scabland fleabane (*Erigeron bloomeri* var. *bloomeri*), western needlegrass, spreading groundsmoke (*Gayophytum diffusum*), mule's ears, and mountain monardella (*Monardella odoratissima*). Plants are dormant in winter and active growth and flowering take place in late spring and early summer. This vegetation type is successional following fire or other catastrophic disturbance and is generally found on dry exposed sites in the lower coniferous zone on shallow, rocky soils between 5,000 and 8,000 feet elevation (Holland 1986).

The dynamics of montane chaparral are closely related to fire (Hanes 1977, California Interagency Task Force Group 2002). Many chaparral shrubs produce new shoots from their stem bases after their crowns have been killed by fire. Tobacco brush is one such species that resprouts prolifically following fire. In addition, tobacco brush and greenleaf manzanita develop banks of seed that remain dormant in the soil until stimulated to germinate following fire. The combination of sprouting and seedling recruitment following fire rapidly replenishes the shrub layer of this vegetation type. The Cottonwood fire appears to have expanded tobacco brush and manzanita dominated vegetation into areas that were previously tree dominated.

Crown fires that remove the tree layer and result in chaparral shrubs dominating the site after a fire can also reduce or practically eliminate post-fire establishment of trees by:

- eliminating on-site seed sources if all trees are killed,
- limiting dispersal of tree seeds onto the site if trees have been eliminated from a large area, and
- competing with and reducing the growth and survival of tree seedlings that do become established.

If regeneration of conifers is limited following a fire, or if a subsequent fire eliminates conifer regeneration, the chaparral patches that originate after fires can persist for decades.

Curlleaf Mountain Mahogany Woodland

This vegetation type is characterized by a scattered to continuous canopy of curlleaf mountain mahogany (*Cercocarpus ledifolius*) trees and shrubs mostly 10 to 30 feet tall. Emergent Jeffrey pine and western juniper (*Juniperus occidentalis*) trees are occasionally present but make up less than 20% of the relative tree cover. This vegetation type was identified only in a few small areas of the main Antelope Valley unit, but other areas that contain a higher percentage of Jeffrey pine and/or western juniper above the intermediate curlleaf mountain mahogany layer were also present and are described below. A shrub layer made up of species typical of the big sagebrush scrub type is present beneath the taller mountain mahogany plants. Curlleaf mountain mahogany occurs on drier, more exposed sites, such as ridges, within the eastside pine forest.

Curlleaf mountain mahogany woodland generally occurs on harsh, rocky sites with low fuel loads, so it is somewhat protected from fire and often escapes burning. However, research indicates that its exclusion from fires over the last 100 years has increased the abundance of curlleaf mountain mahogany and successful regeneration in many areas. The frequent fires of pre-European settlement restricted mountain mahogany to only those rocky or thin-soiled sites where fires were less frequent (Gucker 2006). Curlleaf mountain mahogany is typically absent from areas that burn frequently and abundance of this species is almost always higher on unburned sites than burned sites (Gucker 2006). This is caused by the species' high susceptibility to mortality in all but the coolest burning fires, extremely weak ability to resprout after fire kills the crown, and seed banks that typically do not survive high-intensity fires. Therefore, frequent fire, even of low intensity, can reduce abundance of curlleaf mountain mahogany and eventually lead to the conversion of curlleaf mountain mahogany woodland to other vegetation types, such as grassland or chaparral.

Jeffrey Pine–Curlleaf Mountain Mahogany Woodland

This vegetation type is similar to the curlleaf mountain mahogany type described previously, but Jeffrey pine comprises at least 20% of the total overstory cover. Western juniper may also be a substantial component of the overstory in some areas mapped as Jeffrey pine–curlleaf mountain mahogany. Mountain mahogany forms a substantial intermediate tree layer approximately 20 feet tall beneath a taller, more open Jeffrey pine canopy. Bitterbrush is typically the dominant species in the shrub layer and western needlegrass and Idaho fescue are generally important components of the herbaceous layer. This type occurs primarily on the slopes facing the upper west of the main Antelope Valley unit and is more common than vegetation types dominated solely by mountain mahogany.

Western Juniper Woodland

This woodland vegetation type is characterized by an open tree canopy dominated by western juniper trees up to 50 feet tall over a big sagebrush scrub layer. Western juniper stands in the wildlife area typically include Jeffrey pine or Ponderosa pine in the tree layer and are present in the main Antelope Valley unit and Merry-Go-Round Unit, mostly on south or west-facing slopes. Western juniper woodland generally occurs on dry, shallow, rocky soils above the sagebrush and bitterbrush scrub belts, but lower than the eastside pine and Jeffrey pine–curlleaf mountain mahogany vegetation types.

The dynamics of woodlands dominated by western juniper and mountain mahogany differ from montane forests in several important aspects. These include smaller tree sizes, slower growth of trees, greater tree longevity, and longer intervals between stand-replacing disturbances. These woodlands generally occur on rockier, shallower soils on which tree growth is slower and vegetation is relatively patchy. In addition to being slow-growing, the tree species that dominate these sites live a long time: curlleaf mountain mahogany can live for over 700 years and western juniper can live for 2,000–3,000 years (Gucker 2006). Consequently, change in structure (and in species composition) is slow in the absence of major disturbance. And, because of the limited and discontinuous fuels in many of these woodlands, stand-replacing fire is a relatively rare event—despite these tree species being vulnerable to mortality from fire (Tirmenstein 1999, Gucker 2006). Therefore, the dynamics of these woodlands tend to result in ancient stands with very stable structures.

Eastside Pine Forest

Eastside pine is the predominant vegetation type in the main Antelope Valley unit, and is also found on ridgelines and north and east-facing slopes of the other units. It occurs at elevations just above the big sagebrush and bitterbrush-sagebrush scrub or western juniper types and intergrades with Sierran-mixed conifer forest on moister sites (this vegetation type was not observed in the wildlife area) and Jeffrey pine forest on drier sites. Although this vegetation type is generally described as being dominated by ponderosa pine (*Pinus ponderosa*), Jeffrey pine appears to be the dominant tree species in areas mapped as eastside pine forest in the wildlife areas, although ponderosa pine is also present and may be dominant in some areas. Associate tree species include incense cedar (*Calocedrus decurrens*), white fir (*Abies concolor*), and western juniper (*Juniperus occidentalis* var. *occidentalis*). The tree canopy varies from open to dense, with absolute tree cover ranging from approximately 10 to 40%, depending on site factors such as slope, aspect, soil characteristics, and whether or how recently the particular stand burned. Shadier slopes have denser tree canopies than sunnier and rockier slopes and ridgelines, and stands that burned during the Cottonwood or Harding fires are more open than those that have not burned in the recent past. A shrub layer is typically present and better developed in more open forest stands. Common associate shrub species include mahala mat (*Ceanothus prostratus*), creeping snowberry (*Symphoricarpos mollis*), big sagebrush, bitterbrush, curlleaf mountain mahogany, and rabbitbrush (*Chrysothamnus* spp.). This vegetation type is usually found on coarse, well-drained basaltic soils at elevations between 4,000 and 6,000 feet.

Frequent fire has historically exerted a strong influence on forest structure in the Sierra Nevada, including the Sierra Valley watershed. Historically, fires occurred at intervals of 2–20 years in Sierran conifer forests, with shorter average intervals in pine-dominated forests and longer intervals in fir forests and at higher elevations (Roy and Vankat 1999, Taylor and Beaty 2005). Before European settlement, conifer forests in the Sierra Nevada were reportedly open, park like stands of large pine and fir trees with a grassy understory (SVRCD 2005). Frequent low-intensity fires rejuvenated grasslands and consumed dead woody debris and leaf litter from the forest floor and high-intensity crown fires that consumed mature individuals were infrequent (SVRCD 2005). During the 20th century, policies of fire exclusion were implemented throughout the region, reducing fire frequency and allowing the recruitment of large numbers of trees that would have been removed as saplings under a regime of frequent fire. As a result, many forest stands have become denser and have higher loads of surface fuels. This change in stand structure has increased fire hazards because more intense fires, which may spread through the canopy and cause substantial tree mortality, are now much more likely.

INVASIVE PLANT SPECIES AND NOXIOUS WEEDS

As defined by the California Invasive Plant Council (CalIPC), invasive plants are species that are not native to, but can spread into California wildland ecosystems, and can displace or hybridize with native species, alter biological communities, or alter ecosystem processes. Human activities have facilitated the expansion of thousands of plant species beyond their native ranges; a small fraction of these, generally around 10% of introduced species, spread and persist into native ecosystems and have serious affects on their introduced environment (Williamson 1996). These effects can include alteration of hydrological patterns, fire cycles, and soil chemistry; reduction of available nutrients, water, and light; and reduction of biodiversity (Coblentz 1990, Vitousek et al. 1996, CalIPC 2006). The impacts of invasive plant species can decrease wildlife habitat values and reduce the quality of rangeland forage for livestock (SVRCD 2006).

Infestations of invasive plants generally originate in areas where soil and vegetation have been disturbed and where the removal of native vegetation provides an opportunity for propagules of introduced species to establish, grow, reproduce, and eventually spread throughout the disturbed area and possibly into adjacent undisturbed vegetation (Truckee River Watershed Council 2006).

Invasive plant species known to occur in the Sierra Valley watershed, and therefore possibly present in the wildlife areas, are listed in Table 3.3-2. These are species that are either listed as invasive by CalIPC or identified as noxious weeds by the California Department of Food and Agriculture (CDFA). CalIPC is a non-governmental organization that maintains an inventory of invasive plants that threaten California's wildlands. The invasiveness of each plant species in the inventory is categorized by CalIPC as high, moderate, or limited based on an assessment of the species' ecological impact.

Table 3.3-2
Invasive Plants and Noxious Weeds in Sierra Valley Watershed

Species	Rating		Habitat and Other Comments	Presence in Wildlife Area
	CalIPC	CDFA		
Cheatgrass *Bromus tectorum*	High	None	Interior scrub, woodlands, grasslands. Most widely distributed invasive plant in the U.S.	Common and widespread in the wildlife area, particularly in burned areas and areas cleared by timber harvest. Heavy infestations mostly confined to small patches.
Heart-podded hoarycress *Cardaria draba*	Moderate	B	Riparian areas, marshes of central coast.	Unlikely; the wildlife area is higher than the species' typical elevation range.
Musk thistle *Carduus nutans*	Moderate	None	Grasslands. More invasive in other western states; limited distribution in California.	Known in the Bear Valley Creek Unit and fairly widespread in the immediate vicinity.
Spotted knapweed *Centaurea maculosa*	High	A	Riparian habitats, grasslands, wet meadows, forests. More widely distributed in other western states.	Known near Loyalton, but not known in the wildlife area. Close to eradication in the Sierra Valley watershed.
Yellow starthistle *Centaurea solstitialis*	High	C	Grasslands, woodlands, occasionally riparian habitats.	Not known in the wildlife areas. Uncommon in the Sierra Valley watershed, but a small infestation is known near State Route 49, approximately 3 miles southwest of the wildlife areas.
Canada thistle *Cirsium arvense*	Moderate	B	Grasslands, riparian habitats, forests. Severe impacts in other western states; limited distribution in California.	Known to be present in the wildlife areas.

Table 3.3-2
Invasive Plants and Noxious Weeds in Sierra Valley Watershed

Species	Rating		Habitat and Other Comments	Presence in Wildlife Area
	CalIPC	CDFA		
Bull thistle *Cirsium vulgare*	Moderate	*	Riparian habitats, marshes, meadows. Widespread, can be very problematic regionally.	Likely present; species is widespread throughout the region, but large infestations not observed in the wildlife areas.
Poison hemlock *Conium maculatum*	Moderate	None	Riparian woodland, grassland. Widespread in disturbed areas.	Not known in the wildlife areas but could occur.
Field bindweed *Convolvulus arvensis*	None	C	Grasslands, orchards, disturbed areas.	Unlikely; the wildlife areas are higher than the species' typical elevation range.
Bermuda grass *Cynodon dactylon*	Moderate	C	Riparian scrub. Common landscape weed; can be very invasive in desert washes.	Unlikely; the wildlife areas are higher than the species' typical elevation range.
Scotch broom *Cytisus scoparius*	High	C	Coastal scrub, oak woodland. Horticultural varieties may also be invasive.	Not known in the wildlife areas or nearby, and the wildlife areas are higher than the species' typical elevation range.
Leafy spurge *Euphorbia esula*	High	A	Forests, woodlands. More widespread in northern states.	Not known in the wildlife areas but known near Loyalton, approximately 2 miles from the wildlife areas.
Klamath weed *Hypericum perforatum*	Moderate	C	Many northern California habitats. Abiotic impacts low; biological control agents have reduced overall impact.	Unlikely; the wildlife areas are higher than the species' typical elevation range.
Perennial pepperweed *Lepidium latifolium*	High	B	Marshes, riparian habitats, wetlands, grasslands. Potential to invade montane wetlands.	Known infestations in the Bear Valley Creek Unit.
Dalmatian toadflax *Linaria genistifolia* ssp. *dalmatica*	Moderate	A	Grasslands, forest clearings. Limited distribution; more severe impacts in other western states.	Not known in the wildlife areas, but infestations known near Loyalton.
Scotch thistle *Onopordum acanthium*	High	A	Wet meadows, sagebrush scrub, riparian areas.	Not known in the wildlife areas. Nearest known infestation is several miles away. Close to eradication in the Sierra Valley watershed.
Russian thistle *Salsola tragus*	Limited	C	Desert dunes and scrub, alkali playas. Widespread but impacts are minor in wildlands.	Known; present in burned eastside pine forest in the Antelope Valley Unit.
Mediterranean sage *Salvia aethiopis*	Limited	B	Sagebrush scrub, juniper woodland, perennial grassland. Limited distribution; impacts minor but can be locally significant.	Not known in the wildlife areas or immediate vicinity. Several occurrences in the Sierra Valley watershed.
Medusahead grass *Taeniatherum caput-medusae*	High	C	Grasslands, scrub, woodlands.	Not known. Typically thought restricted to the foothills on east side of the Sierra, but reportedly occurs in the Sierra Valley.
Puncture vine *Tribulus terrestris*	None	C	Roadsides, vacant lots, other disturbed areas. Does not present a serious ecological threat to native vegetation.	Unlikely; the wildlife areas are higher than the species' typical elevation range.

Table 3.3-2
Invasive Plants and Noxious Weeds in Sierra Valley Watershed

Species	Rating		Habitat and Other Comments	Presence in Wildlife Area
	CalIPC	CDFA		
Woolly mullein *Verbascum thapsus*	Limited	None	Meadows, riparian habitats, sagebrush scrub, pinyon-juniper woodland. Widespread; impacts minor.	Known; scattered plants present throughout the riparian and meadow communities in the Antelope Valley and Bear Valley Creek Units. No large patches observed.

Notes: CalIPC = California Invasive Plant Council; CDFA = California Department of Food and Agriculture.

CalIPC Ratings:

High—Species have severe ecological impacts on physical processes, plant and animal communities, and vegetation structure. Reproductive biology and other attributes are conducive to moderate to high rates of dispersal and establishment and most are widely distributed.

Moderate—Species have substantial and apparent, but generally not severe, ecological impacts on physical processes, plant and animal communities, and vegetation structure. Reproductive biology and other attributes are conducive to moderate to high rates of species dispersal, but establishment is generally dependent on disturbance; ecological amplitude and distribution ranges from limited to widespread.

Limited—Species are invasive but ecological impacts are minor on a statewide level or not enough information exists for a higher score. Reproductive biology and other attributes result in low to moderate rates of invasiveness; ecological amplitude and distribution are generally limited, but these species may be locally persistent and problematic.

CDFA Ratings:

A—Known economic importance subject to state/county enforced action involving eradication, quarantine regulation, containment, rejection, or other holding action.

B—Known economic importance subject to eradication, containment, control, or other holding action at the discretion of the individual county agricultural commissioner, or an organism of known economic importance subject to state-endorsed holding action and eradication only when found in a nursery.

C—An organism subject to no state-enforced action outside of nurseries except to retard spread, generally at the discretion of a commission or an organism subject to no state-enforced action except to provide for pest cleanliness standards in nurseries.

* Under consideration, not yet rated

Sources: CalIPC 2006, CDFA 2007, and SVRCD 2005

The term noxious weed is used by government agencies to apply to plant species that have been defined as pests by law or regulation. CDFA is a government agency that regulates the sale, introduction, and spread of plants defined as noxious weeds by California law. California law defines noxious weeds as "any plant species that is, or is liable to be, troublesome, aggressive, intrusive, detrimental, or destructive to agriculture, silviculture, or important native species and is difficult to control or eradicate" (CDFA 2007). Whereas CalIPC's invasive plant inventory is focused on species that have an ecological impact, CDFA's focus is primarily on species that have an economic impact on agriculture in California. Unlike CDFA, CalIPC has no regulatory authority; however, CDFA biologists may consult with technical advisors to CalIPC when determining whether or not to list a plant as a noxious weed. Plants identified as noxious weeds by CDFA are assigned a rating that reflects CDFA's view of the statewide importance of the species, the likelihood that eradication or control efforts would be successful, and the present distribution of the species within the state (CDFA 2007).

SPECIAL-STATUS PLANT SPECIES

A list of sensitive and special-status plant species that are known to be or could be present in the wildlife areas was developed through review of the following resources:

- the Department's CNDDB (2007) records within a 5-mile radius of the wildlife areas;
- California Native Plant Society's (CNPS) Inventory of Rare and Endangered Plants of California (CNPS 2007) records within the Antelope Valley and Loyalton USGS 7.5-minute quadrangles and surrounding

quadrangles (Portola, Reconnaissance Peak, Chilcoot, Beckwourth Pass, Calpine, Evans Canyon, Sattley, Sierraville, Sardine Peak, and Dog Valley); and

- Rare Plant Surveys at the Antelope Valley, Smithneck Creek, and Crocker Meadows Wildlife Areas, Sierra and Plumas Counties (Witham 1993).

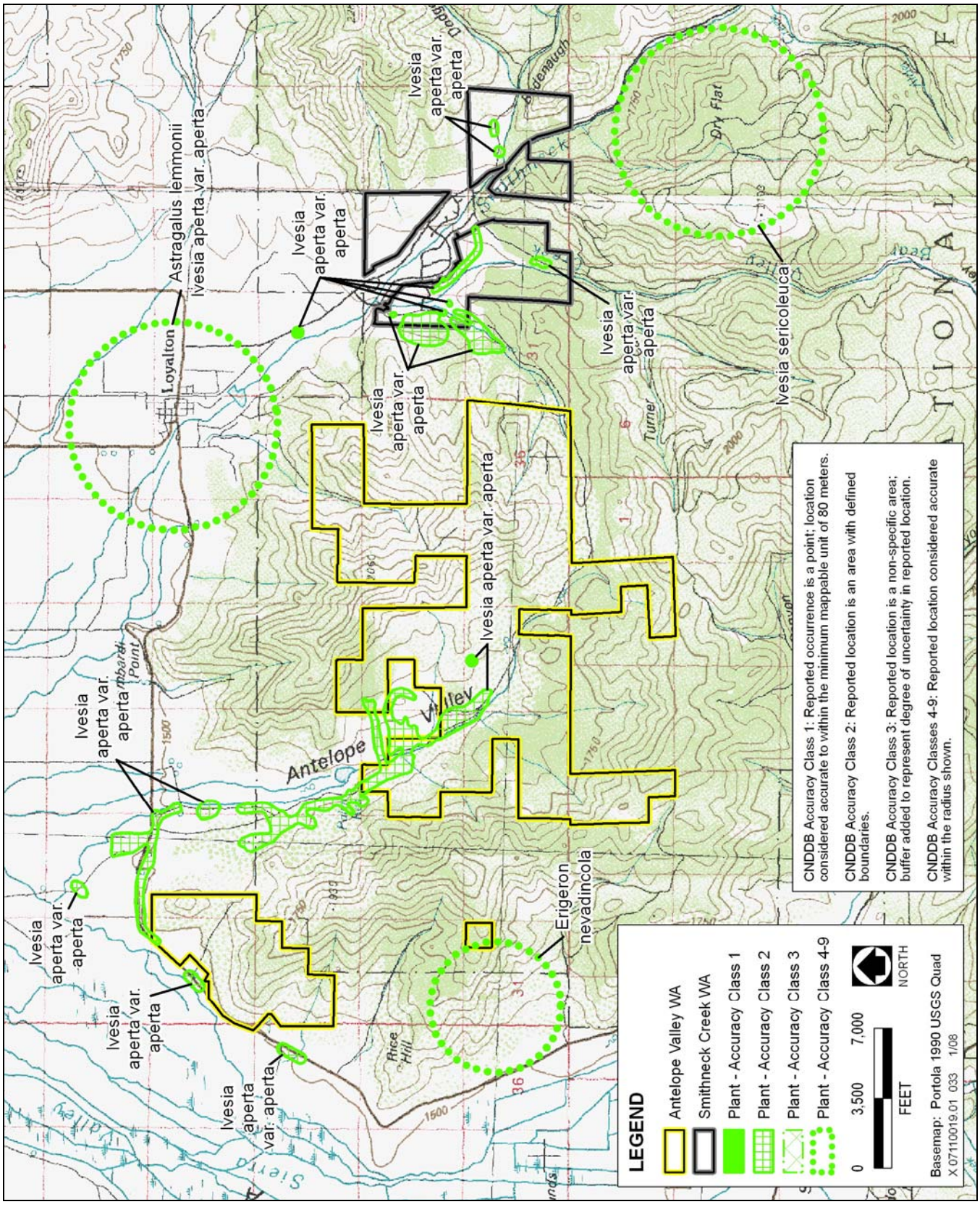
Special status plants are defined as plants that are legally protected or that are otherwise considered sensitive by federal, state, or local resource conservation agencies and organizations. Special-status plant taxa are species, subspecies, or varieties that fall into one or more of the following categories, regardless of their legal or protection status:

- officially listed by California or the federal government as endangered, threatened, or rare;
- a candidate for federal or state listing as endangered, threatened, or rare;
- taxa that meet the criteria for listing, even if not currently included on any list, as described in Section 15380 of the State CEQA Guidelines;
- taxa designated as a special-status, sensitive, or declining species by other federal or state agencies or nongovernmental organizations (including species classified as sensitive by BLM); and
- taxa considered by CNPS to be "rare, threatened, or endangered in California" (Lists 1B and 2).

The CNPS inventory includes five lists for categorizing plant species of concern, which are summarized below. The plants listed on CNPS lists 1A, 1B, and 2 meet the definitions of Section 1901, Chapter 10 of the Native Plant Protection Act or Sections 2062 and 2067 of the California Endangered Species Act (CESA) and the California Fish and Game Code and may qualify for state listing. Therefore, they are considered rare plants pursuant to Section 15380 of CEQA. DFG recommends, and local government agencies may require, that they be fully considered during preparation of environmental documents relating to CEQA (Department 2006a). Some of the plants constituting CNPS Lists 3 and 4 meet the definitions of Section 1901, Chapter 10 or Sections 2062 and 2067 of the California Fish and Game Code and are eligible for state listing. The Department recommends, and local governments may require, protection of plants that are regionally important, such as locally rare species, disjunct populations of more common plants (i.e., isolated populations that may harbor unique genetic properties), or plants on CNPS List 3 and List 4 (Department 2006a). Therefore, CNPS List 3 and 4 species should be evaluated for consideration during preparation of environmental documents relating to CEQA. The CNPS lists are defined as follows:

- **List 1A** Plants presumed extinct in California
- **List 1B** Plants rare, threatened, or endangered in California and elsewhere
- **List 2** Plants rare, threatened, or endangered in California but more common elsewhere
- **List 3** Plants about which more information is needed—a review list
- **List 4** Plants of limited distribution—a watch list

Although no records of federally or state-listed plant species were found through the database and literature review, one species that is a candidate for federal listing and a number of species that are listed as rare or endangered by CNPS or that are considered sensitive by USFS have been documented in the wildlife areas or in the vicinity. Table 3.3-3 lists these species and provides information on their listing status, habitat, distribution, flowering period, and potential for occurrence in the wildlife areas. Exhibit 3.3-2 shows the locations of sensitive plant species documented within 1 mile of the wildlife areas' boundaries. Special-status plant species identified through the database and literature review process are considered to have potential for existence in the wildlife areas if suitable habitat is present and the wildlife area is within the species' known distribution and elevation range. A brief description of the special-status plant species that are known or have potential to occur in the wildlife area is provided in Table 3.3-3.



Source: CNDDB 2007a, Department 2007, USFS 2006

CNDDB Plant Occurrences within 5 miles of the Antelope Valley and Smithneck Creek Wildlife Areas **Exhibit 3.3-2**

Table 3.3-3
Special-Status Plant Species Known or with Potential to Occur in the Antelope Valley and Smithneck Creek Wildlife Areas

Species	Listing Status			Habitat	Distribution in California	Flowering Period	Potential for Occurrence
	Fed.	State	CNPS				
Purple milk-vetch *Astragalus agrestis*	–	–	2.2	Vernally mesic sites in meadows and seeps and great basin scrub; 5,000–5,400 foot elevations	Lassen and Sierra Counties	April–July	Could occur; suitable habitat is present and species is documented in surrounding quadrangles, but not within 5 miles of the wildlife areas.
Lemmon's milk-vetch *Astragalus lemmonii*	–	–	1B.2	Great Basin scrub, meadows and seeps, and lake shore marshes and swamps; 3,300–7,200 foot elevations	Great Basin Modoc Plateau and adjacent northern Sierra Nevada, also Mono County	May–August	Could occur; suitable habitat is present and species has been documented less than 1 mile from the main Antelope Valley unit.
Lens-pod milk-vetch *Astragalus lentiformis*	–	–	1B.2	Sandy volcanic soils in Great Basin scrub and lower montane coniferous forest; 4,800–6,300 foot elevations	Northern Sierra Nevada primarily in southeast Plumas County, but a few occurrences in Sierra County	May–July	Could occur; suitable habitat is present and species is documented in surrounding quadrangles but not within 5 miles of the wildlife areas.
Pulsifer's milk-vetch *Astragalus pulsiferae* var. *pulsiferae*	–	–	1B.2	Sandy or rocky, usually granitic, soils in Great Basin scrub, lower montane coniferous forest, and pinyon juniper woodland; 4,200–5,900 foot elevations	Northern Sierra Nevada and eastern Modoc Plateau from Modoc County to Sierra County	May–August	Could occur; suitable habitat is present and species is documented in surrounding quadrangles but not within 5 miles of the wildlife areas.
Hillman's silverscale *Atriplex argentea* var. *hillmanii*	–	–	2.2	Alkaline soils in Great Basin scrub and meadows and seeps; 4,000–5,600 foot elevations	Northern Sierra Nevada and eastern and southern Modoc Plateau from Modoc County to Calaveras County, also eastern Sierra Nevada in Mono and Inyo Counties	June–September	Could occur; suitable habitat is present and species is documented in surrounding quadrangles but not within 5 miles of the wildlife areas.
Moonwort *Botrychium lunaria*	–	–	2.3	Meadows and seeps in upper montane and subalpine coniferous forest; 7,000–10,000 foot elevations	Modoc plateau and Sierra Nevada highlands in Modoc, Sierra, Nevada, Mono, Tuolumne, and Tulare Counties	August	Unlikely; although this species is documented in surrounding quadrangles, it is not expected to occur because its known elevation range is higher than the wildlife areas.

Table 3.3-3
Special-Status Plant Species Known or with Potential to Occur in the Antelope Valley and Smithneck Creek Wildlife Areas

Species	Listing Status			Habitat	Distribution in California	Flowering Period	Potential for Occurrence
	Fed.	State	CNPS				
Sierra Valley evening-primrose *Camissonia tanacetifolia* ssp. *qudriperforata*	–	–	4.3	Vernally mesic clay flats in Great Basin scrub; 4,200–5,000 foot elevation	Northern Sierra Nevada highlands and Modoc Plateau from Lassen to Sierra County		Known; species has been documented in the main Antelope Valley unit and Bear Valley Creek Unit.
Constance's sedge *Carex constanceana*	–	–	1B.1	Mesic, shady sites in subalpine coniferous forest; 6,600 foot elevations	Sierra Nevada in Nevada and Sierra Counties	August	Unlikely; although this species is documented in a surrounding quadrangle, known occurrences are above the wildlife areas' elevation ranges.
Valley sedge *Carex vallicola*	–	–	2.3	Mesic sites in Great Basin Scrub, meadows and seeps; 5,000–9,200 foot elevations	Modoc Plateau, Modoc, Lassen, and Sierra Counties and east of Sierra Nevada in Alpine and Mono Counties	July–August	Could occur; suitable habitat is present and species is documented in surrounding quadrangles but not within 5 miles of the wildlife areas.
Globose cymopterus *Cymopterus globosus*	–	–	2.2	Sandy, open flats in Great Basin scrub; 4,000–7,000 foot elevations	Mono, Nevada, Plumas, and Sierra Counties	March–June	Could occur; suitable habitat is present and species has been documented within 5 miles of the wildlife areas.
Subalpine fireweed *Epilobium howellii*	–	–	1B.3	Mesic sites in subalpine coniferous forest and meadows and seeps; 6,600–9,000 foot elevations	Sierra Nevada in El Dorado, Fresno, Madera, Nevada, Sierra, and Tuolumne Counties	July–August	Unlikely; although this species is documented in a surrounding quadrangle, known occurrences are in subalpine habitats above the wildlife areas' elevation ranges.
Nevada daisy *Erigeron nevadincola*	–	–	2.3	Rocky sites in Great Basin scrub, lower montane coniferous forest, and pinyon and juniper woodland; 4,500–9,500 foot elevation	Lassen, Placer, Plumas, Sierra, and Nevada Counties	May–July	Could occur; one CNDDB occurrence polygon overlaps with the southern parcel of the Merry-Go-Round Unit and suitable habitat is present throughout the wildlife areas.
Ochre-flowered buckwheat *Eriogonum ochrocephalum* var. *ochrocephalum*	–	–	2.2	Volcanic or clay soils in Great Basin scrub or pinyon-juniper woodland; 4,000–8,000 foot elevations	Modoc Plateau in Modoc, Lassen, Plumas, Shasta and Siskyou Counties	May–June	Unlikely; although documented in a surrounding quadrangle, this species is restricted to the Modoc Plateau.

Table 3.3-3
Special-Status Plant Species Known or with Potential to Occur in the Antelope Valley and Smithneck Creek Wildlife Areas

Species	Listing Status			Habitat	Distribution in California	Flowering Period	Potential for Occurrence
	Fed.	State	CNPS				
Donner Pass buckwheat *Eriogonum umbellatum* var. *torreyanum*	–	–	1B.2	Volcanic, rocky soils in meadows and upper montane coniferous forest; 6,000–8,600 foot elevations	Sierra Nevada in Sierra, Nevada, and Placer Counties	July–September	Could occur; suitable habitat is present and species is documented in surrounding quadrangles but not within 5 miles of the wildlife area.
Alkali hymenoxys *Hymenoxys lemmonii*	–	–	2.2	Subalkaline soils in Great Basin scrub, lower montane coniferous forest, and meadows and seeps, 750–3,300 foot elevations	Cascade Range, Modoc Plateau, Sierra Nevada (Plumas and Fresno Counties), and White and Inyo Mountains	June–August	Unlikely; although this species is documented in a surrounding quadrangle, this species' elevation range is lower than the wildlife areas.
Sierra Valley ivesia *Ivesia aperta* var. *aperta*	–	–	1B.2	Vernally mesic sites in Great Basin scrub, lower montane coniferous forest, pinyon-juniper woodland, meadows and seeps, and vernal pools; usually on volcanic soils; 4,800–7,500 foot elevations	Sierra Valley in Lassen, Plumas, and Sierra Counties	June–September	Known; this species has been documented in the main Antelope Valley unit and Merry-Go-Round, Bear Valley Creek, and Badenaugh Units of the wildlife areas.
Dog Valley ivesia *Ivesia aperta* var. *canina*	–	–	1B.1	Rocky volcanic soils in lower montane coniferous forest and dry meadows; 5,200–6,500 foot elevations	Dog Valley, eastern Sierra and Nevada Counties	June–August	Unlikely; although suitable habitat is present and species is documented in surrounding quadrangles, this variety is apparently restricted to Dog Valley.
Bailey's ivesia *Ivesia baileyi* var. *baileyi*	–	–	2.3	Rocky volcanic soils in Great Basin scrub and lower montane coniferous forest, particularly volcanic crevices; 4,400–8,500 foot elevations	Southern Modoc Plateau and adjacent Sierra Nevada highlands of Lassen and Plumas Counties	May–August	Could occur; suitable habitat is present and species is documented in surrounding quadrangles but not within 5 miles of the wildlife areas.
Plumas ivesia *Ivesia sericoleuca*	–	–	1B.2	Vernal pools or vernally mesic sites in Great Basin scrub, lower montane coniferous forest, meadows and seeps; usually on volcanic soils; 4,800–7,200 foot elevations	Northern Sierra Nevada and southern Modoc Plateau from Lassen to Placer County	May–September	Could occur; a documented occurrence of this species is approximately 1 mile south of the Badenaugh and Bear Valley Creek Units and suitable habitat is present

Table 3.3-3
Special-Status Plant Species Known or with Potential to Occur in the Antelope Valley and Smithneck Creek Wildlife Areas

Species	Listing Status			Habitat	Distribution in California	Flowering Period	Potential for Occurrence
	Fed.	State	CNPS				
Webber's ivesia *Ivesia webberi*	C	–	1B.1	Sandy or gravelly soils and volcanic ash in Great Basin scrub, lower montane coniferous forest, and pinyon-juniper woodland; 3,200–6,800 foot elevations	Northern Sierra Nevada and southern Modoc Plateau in Lassen, Plumas, and Sierra Counties	May–July	Could occur; suitable habitat is present and species is documented in surrounding quadrangles but not within 5 miles of the wildlife areas.
Sagebrush loeflingia *Loeflingia squarrosa* var. *artemisiarum*	–	–	2.2	Desert sand dunes or sandy flats in Great Basin scrub and Sonoran Desert scrub; 2,300–5,300 foot elevations	Widely distributed throughout central and southern California including central and southern coasts, Mojave and Sonoran Deserts, disjunct populations in the Great Basin Desert in Lassen and Plumas Counties	April–May	Unlikely; although this species is documented in a surrounding quadrangle, suitable sandy dunes and flats are not present in the wildlife areas.
Tall alpine-aster *Oreostemma elatum* (=*Aster alpigenus* var. *andersonii)*	–	–	1B.2	Bogs and fens, meadows and seeps, mesic sites in upper montane coniferous forest; 3,300–7,000 foot elevations	Klamath, Cascade, and North Coast Ranges; Sierra Nevada, San Jacinto, Warner, White and Inyo Mountains	June–August	Could occur; suitable habitat is present and species is documented in surrounding quadrangles but not within 5 miles of the wildlife areas.
Modoc County knotweed *Polygonum polygaloides* ssp. *esotericum*	–	–	1B.1	Vernal pools, meadows and seeps, and other seasonally wet habitats in Great Basin scrub and lower montane coniferous forest; 4,900–5,500 feet elevations	Modoc Plateau and Sierra Valley from Modoc County to Plumas County	May–August	Could occur; suitable habitat is present and species is documented in surrounding quadrangles but not within 5 miles of the wildlife areas.
Sticky pyrrocoma *Pyrrocoma lucida*	–	–	1B.2	Alkaline clay soils in Great Basin scrub, lower montane coniferous forest, and meadows and seeps; 2,300–6,400 foot elevations	Northern Sierra Nevada from Lassen to Sierra and Yuba Counties	July–October	Unlikely; although this species has been documented within 5 miles, it is not expected to occur in the wildlife areas because of unsuitable soil conditions.

Table 3.3-3
Special-Status Plant Species Known or with Potential to Occur in the Antelope Valley and Smithneck Creek Wildlife Areas

Species	Listing Status			Habitat	Distribution in California	Flowering Period	Potential for Occurrence
	Fed.	State	CNPS				
Winged dock *Rumex venosus*	–	–	2.3	Sandy soils in Great Basin scrub; 4,000–6,000 foot elevations	Modoc Plateau, Lassen County	May–June	Unlikely; although documented in a surrounding quadrangle, this species is not expected to occur because the wildlife areas are outside its known distribution range in California.
Green-flowered prince's plume *Stanleya viridiflora*	–	–	2.3	White ash deposits in Great Basin scrub; 4,200–5,200 foot elevations	Southern Modoc Plateau, Lassen and Plumas Counties	May–August	Unlikely; although documented in a surrounding quadrangle, this species is not expected to occur because the wildlife areas are outside its known distribution range in California.
Lemmon's clover *Trifolium lemmonii*	–	–	4.2	Openings and rocky flats in Great Basin scrub and lower montane coniferous forest; 5,000–7,000 foot elevations	Plumas, Sierra, and Nevada Counties	May–July	Known; this species has been documented in the main Antelope Valley unit.
Golden violet *Viola aurea*	–	–	2.2	Sandy soils in Great Basin scrub and pinyon-juniper woodland; 3,200–6,700 foot elevations	Scattered distribution in the Great Basin and Mojave Deserts.	April–June	Could occur; suitable habitat is present and species is documented in surrounding quadrangles but not within 5 miles of the wildlife areas.

U.S. Fish and Wildlife Service (USFWS) Federal Listing Categories:

FT Federal Threatened
FE Federal Endangered
C Candidate for Federal Listing as Threatened or Endangered

California Department of Fish and Game State Listing Categories:

CR California Rare
CT California Threatened
CE California Endangered

California Native Plant Society (CNPS) Listing Categories:

1B Plants rare, threatened, or endangered in California and elsewhere
2 Plants rare, threatened, or endangered in California but more common elsewhere
3 Plants for which more information is needed—a review list
4 Plants of limited distribution—a watch list

Extensions:

1 Seriously endangered in California (>80% of occurrences are threatened and/or high degree and immediacy of threat
2 Fairly endangered in California (20 to 80% of occurrences are threatened)
3 Not very endangered in California (<20% of occurrences are threatened or no current threats are known)

Source: CNDDB 2007, CNPS 2007, Witham 1993, data compiled by EDAW in 2007.

Purple Milk-Vetch

Purple milk-vetch (*Astragalus agrestis*) is a perennial herb species in the pea family (Fabaceae). This species is considered fairly endangered in California, but is more common in other states within the Great Basin. CNPS considers a species to be fairly endangered when 20–80% of known occurrences are threatened. In California, it is known from only five occurrences in Lassen and Sierra counties. This species is found in vernally moist habitats in Great Basin scrub and meadows and seeps from approximately 5,000- to 5,400-foot elevations. The nearest documented occurrence of purple milk-vetch is by Long Valley Creek in the Evans Canyon quadrangle approximately 8 miles from the wildlife areas.

Lemmon's Milk-Vetch

Lemmon's milk-vetch (*Astragalus lemmonii*), a perennial herbaceous member of the pea family, is considered fairly endangered in California and is also rare, threatened or endangered in Nevada and Oregon, the only other states where it exists. Its distribution in California is primarily within the Modoc Plateau, but known occurrences are in the adjacent Sierra and Mono counties as well. There is a documented occurrence of Lemmon's milk-vetch within 1 mile north of the main Antelope Valley unit just south of the town of Loyalton. Suitable habitat for this species is Great Basin scrub, meadows and seeps, and lake shore marshes at elevations from approximately 3,300 to 7,200 feet.

Lens-Pod Milk-Vetch

Lens-pod milk-vetch (*Astragalus lentiformis*) is another perennial herb in the pea family. It has been recorded near the wildlife area is lens-pod milk-vetch. This species is endemic to California and is considered fairly endangered. Its distribution is limited to the Sierra Nevada in Plumas and Sierra counties between 4,800- and 6,300-foot elevations. There are 67 documented occurrences in Plumas County and only three in Sierra County. The nearest occurrences documented in the CNDDB are near Portola approximately 15 miles northwest of the wildlife areas. It is found in sandy volcanic soils in Great Basin scrub and lower montane coniferous forests.

Pulsifer's Milk-Vetch

Pulsifer's milk-vetch (*Astragalus pulsiferae* var. *pulsiferae*), a perennial herbaceous member of the pea family, is found in California and Nevada, but is fairly endangered in both states. In California, it is restricted to the northern Sierra Nevada and eastern Modoc Plateau from Modoc County to Sierra County at elevations between 4,200 and 5,900 feet. The overwhelming majority of documented occurrences are in Lassen and Plumas counties, but two records are of this variety in Sierra County. It has been documented in three of the quadrangles surrounding the wildlife areas, Beckwourth Pass, Chilcoot, and Reconnaissance Peak; but not within 5 miles of the wildlife areas. Pulsifer's milk-vetch is found in Great Basin scrub, lower montane coniferous forest and pinyon and juniper woodland, usually in sandy or rocky granitic soils.

Hillman's Silverscale

Hillman's silverscale (*Atriplex argentea* var. *hillmanii*) is an annual herb species in the goosefoot family (Chenopodiaceae). This species is considered fairly endangered in California, but is more common in Nevada and Oregon. The distribution of this species in California extends through the Modoc Plateau and the northern Sierra Nevada from Modoc County to Calaveras County and the eastern Sierra in Mono and Inyo counties at elevations between 4,000- and 5,600-foot elevations. The nearest documented occurrence is in the Reconnaissance Peak quadrangle. It grows in alkaline soils in Great Basin scrub and meadows and seeps.

Sierra Valley Evening-Primrose

Sierra Valley evening-primrose (*Camissonia tanacetifolia* ssp. *quadriperforata*), a perennial herbaceous member of the evening primrose family (Onagraceae), is endemic to California and is on the CNPS watch list (List 4). It is of limited distribution, known only from Lassen, Plumas, and Sierra Counties, but is abundant where found and

not very endangered at this time. This species was documented by Carol Witham in the main Antelope Valley unit and Bear Valley Creek Unit during surveys conducted in 1993. It grows in vernally moist clay flats in Great Basin scrub from roughly 4,000- to 5,000-foot elevations and it often colonizes disturbed habitats such as roadside drainage ditches (Witham 1993).

Valley Sedge

Valley sedge (*Carex vallicola*), a perennial herb species, is a member of the sedge family (Cyperaceae) and is considered rare in California, but is more common in other Great Basin states. Although it is somewhat rare in California, it is not very endangered at this time, meaning that it has low vulnerability to threats. Its known distribution in California is limited to the Modoc Plateau and eastern Sierra regions of Modoc, Lassen, Sierra, Alpine, and Mono counties at elevations between 5,000 and 9,200 feet. It has been documented in the Evans Canyon quadrangle several miles east of the wildlife areas. It grows in moist sites in Great Basin scrub and meadows and seeps.

Globose Cymopterus

Globose cymopterus (*Cymopterus globosus*) is a perennial herb species in the carrot family (Apiaceae). It is considered fairly endangered in California, but is common in Nevada and Utah. In California this species is known from only five occurrences in Mono and Plumas Counties, including an occurrence within 5 miles northwest of the Merry-Go-Round Unit in the Antelope Valley and Calpine quadrangles. This species is found in sandy open flats in Great Basin scrub at elevations from 4,000 to 7,000 feet.

Nevada Daisy

Nevada Daisy (*Erigeron nevadincola*), a perennial herb species, is a member of the sunflower family (Asteraceae) and is rare in California, but more common in the State of Nevada. Although rare in California, there is currently little known threat to existing populations so the possibility of extinction is very low. Its distribution in California is limited to the Modoc Plateau and Sierra Nevada regions of Lassen, Placer, Plumas, Sierra, and Nevada counties at elevations between 4,500 and 9,500 feet. It has been documented in the immediate vicinity (i.e., within 1 mile) of the isolated southern parcel of the Merry-Go-Round Unit. The CNDDB polygon depicting the location of this occurrence actually overlaps with the unit boundary, however, the mapping accuracy is such that it is uncertain whether this occurrence spans into the wildlife areas or not. Rocky sites in Great Basin scrub, lower montane coniferous forest, and pinyon-juniper woodland provide suitable habitat for this species.

Donner Pass Buckwheat

Donner Pass buckwheat (*Eriogonum umbellatum* var. *torreyanum*) is a perennial herb or subshrub in the buckwheat family. It is endemic to California and is considered fairly endangered because 20 to 80% of existing occurrences are susceptible to currently known threats. Its distribution is limited to Sierra, Nevada, and Placer counties at elevations from approximately 6,000 to 8,900 feet. The nearest known occurrence to the wildlife areas is approximately 9 miles away in the Dog Valley quadrangle. This species grows in rocky volcanic soils in meadows and seeps and upper montane coniferous forest. Nearly all known occurrences of this species are recorded at elevations higher than the wildlife areas, but the upper elevation limits of the wildlife areas do overlap with the lower elevation limits of the species.

Sierra Valley Ivesia

Sierra Valley ivesia (*Ivesia aperta* var. *aperta*) is a perennial herb species in the rose family (Rosaceae) that occurs in the Sierra Valley in Lassen, Plumas, and Sierra counties at elevations ranging from 4,800 to 7,500 feet. This species is also found in the State of Nevada and is considered fairly endangered in both states. Carol Witham documented this species at several locations in the main Antelope Valley unit and Bear Valley Creek and Badenaugh Units during surveys conducted in 1993. Sierra Valley ivesia typically grows in vernally moist

volcanic soils in Great Basin scrub, lower montane coniferous forest, pinyon-juniper woodland, meadows and seeps, and vernal pools. In the wildlife areas, the specific microhabitats where this species was found included rocky ephemeral stream channels, meadows, sagebrush flats, and sparsely vegetated slopes always on sites that receive abundant moisture early in the growing season, but dry up quickly (Witham 1993). Dog Valley ivesia (*Ivesia aperta* var. *canina*) is another rare variety of *Ivesia aperta* that grows in the surrounding area, but is apparently restricted to Dog Valley and is, therefore, unlikely to be found in the wildlife areas. Carol Witham (1993) examined many specimens that seemed to have intermediate characteristics between the two varieties and sent specimens to be examined by Barbara Ertter, who prepared the treatment for this genus in the Jepson Manual. They determined that all specimens collected and observed in the wildlife areas were of the variety *aperta*.

Bailey's Ivesia

Bailey's ivesia (*Ivesia baileyi* var. *baileyi*) is another member of the genus Ivesia that is known to occur in the region. It is rare in California, but not very endangered because there is little known threat to existing populations and it is somewhat common in Idaho, Nevada, and Oregon. In California, the species' distribution is limited to the southern Modoc Plateau region and adjacent Plumas and Lassen counties between 4,400- and 8,500-foot elevations. The nearest known occurrence to the wildlife areas is over 20 miles northeast of the wildlife areas in the Beckwourth Pass quadrangle. This species grows in rocky volcanic soils in Great Basin scrub and lower montane coniferous forest.

Plumas Ivesia

Plumas ivesia (*Ivesia sericoleuca*) is also a perennial herbaceous member of the rose family that is rare in California and known to occur in the region. This ivesia species is endemic to California and is fairly endangered. Its distribution is limited to the northern Sierra Nevada and southern Modoc Plateau regions from Lassen to Placer County at elevations ranging from 4,800 to 7,200 feet. It has been documented approximately 1 mile south of the Badenaugh Unit. Plumas ivesia is found in vernal pools or other seasonally wet sites in Great Basin scrub, lower montane coniferous forest, and meadows and seeps, usually in volcanic soils.

Webber's Ivesia

Webber's Ivesia (*Ivesia webberi*) is native to California and Nevada and is a candidate for federal listing. CNPS lists it as seriously endangered in California, meaning that greater than 80% of the known occurrences are threatened or there is a high degree or immediacy of threat to existing occurrences. Known populations in California are distributed in the northern Sierra Nevada and southern Modoc Plateau regions in Lassen, Plumas, and Sierra counties from 3,200- to 6,800-foot elevations. Webber's ivesia has been documented in the Sierra Valley in the Chilcoot, Dog Valley, and Evans Canyon quadrangles, but there are no known occurrences within 5 miles of the wildlife areas. This species grows in sandy or gravelly soils in Great Basin scrub, lower montane coniferous forest, and pinyon-juniper woodland.

Tall Alpine-Aster

Tall alpine-aster (*Oreostemma elatum* [syn. *Aster alpigenus* var. *andersonii*]) is a perennial herb in the sunflower family and is a California endemic that is considered fairly endangered because, although the species is fairly widely distributed, 20 to 80% of known occurrences are threatened. Its area of distribution includes the Klamath, Cascade, and North Coast Ranges as well as the Sierra Nevada, San Jacinto, Warner, White and Inyo mountains at elevations ranging from 3,300 to 7,000 feet. It has been documented in the Calpine and Sattley quadrangles, but there are no known occurrences within 5 miles of the wildlife areas. It grows in moist sites in upper montane coniferous forest, bogs and fens, and meadows and seeps.

Modoc County Knotweed

Modoc County Knotweed (*Polygonum polygaloides* ssp. *esotericum*) is an annual herbaceous member of the buckwheat family that is seriously endangered in California. It is distributed in the Modoc Plateau region and Sierra Valley from Modoc County to Plumas County and extends only slightly into Oregon. Its known elevation range is from 4,900 to 5,500 feet. Of the 26 known occurrences of this species, 22 are in Modoc County, but it has been reported in the CNPS inventory from the area surrounding the wildlife area in the Antelope Valley, Calpine, and Reconnaissance Peak 7.5' USGS quadrangles. This species grows in vernal pools, meadows and seeps, and other seasonally wet areas in Great Basin scrub and lower montane coniferous forest.

Lemmon's Clover

Lemmon's clover (*Trifolium lemmonii*) is a perennial herb in the pea family and is on CNPS List 4, a watch list for species of limited distribution and is also on the U.S. Forest Service watch list. It is considered fairly endangered in California, where it is known only from Plumas, Nevada, and Sierra counties, but it is also found in the state of Nevada. Carol Witham found one occurrence of Lemmon's clover in the main Antelope Valley unit during surveys conducted in 1993. It grows in openings and rocky flats in Great Basin scrub and lower montane coniferous forest at elevations ranging from 5,000 to 7,000 feet.

Golden Violet (*Viola aurea*)

Golden Violet (*Viola aurea*), a perennial herbaceous member of the violet family (Violaceae), is considered fairly endangered in California, but is more common in the State of Nevada. Its discontinuous distribution in California includes the Great Basin and Mohave Desert in Sierra, Mono, Kern, and San Bernardino counties, as well as occurrences in San Diego and Ventura counties. Golden violet has been documented in the Evan's Canyon quadrangle nearby, but there are no known occurrences within 5 miles of the wildlife areas. This species grows in sandy soils in Great Basin scrub and pinyon-juniper woodland at elevations ranging from 3,200 to 6,700 feet.

3.3.2 WILDLIFE

Wildlife species of AVWA and SCWA include those associated with eastside pine and montane riparian vegetation types as well as sagebrush, bitterbrush, and montane chaparral.

This section provides a general description of the wildlife species that are likely present at AVWA and SCWA, and a more detailed discussion of special-status species that occur, or could potentially occur, at the wildlife areas.

GENERAL DESCRIPTION

Very little wildlife survey information is available that is specific to AVWA and SCWA, and no systematic wildlife inventories have been conducted. Annual summer bat surveys are conducted by San Francisco State University (SFSU) on Antelope Valley Creek in AVWA, and SFSU has compiled a bird checklist of the Sierra Valley and Yuba Pass. Other sources of wildlife records contained in this document include anecdotal records from federal and state wildlife biologists who have worked in or near the wildlife areas, previous land management plans, and a 1996 timber harvest plan. A draft species list exists for AVWA (Department 1997). However, rather than being a list of known occurrences based on field observations, this list was generated from the California Wildlife Habitat Relationships system (CWHR), a predictive model based on habitat types. An updated list based on the CWHR is provided in Appendix F.

Based on the quality and diversity of habitats present, the wildlife areas undoubtedly provide important habitat for numerous species and guilds of wildlife, some of which are described below. The following discussion focuses mainly on wildlife of management concern at the wildlife areas.

Mammals

Mule Deer

Several subspecies of mule deer occur in California, each particularly adapted to a distinct ecological province. The subspecies at the wildlife areas is Rocky Mountain mule deer (*Odocoileus hemionus hemionus*), which is associated with the Intermountain Sagebrush Province. Deer at the wildlife areas are part of the Sierra Valley subunit of the Loyalton-Truckee deer herd (Department 1982).

The wildlife areas are located in an area identified as key winter range for the Sierra Valley subunit and are on the migration route between summer and winter ranges (Department 1982). The wildlife areas were established to protect critical winter range and migration routes for this herd. The deer population in the northeast Sierra Nevada has recently been declining. This decline is linked especially to loss of habitat acreage and quality caused by development, hot summer fires, and grazing (Department 1998).

Mule deer in California generally migrate out of high elevation areas in the fall to valleys and other low-elevation areas that receive less than 2 feet of snow, and then return to mountainous areas as snow melts in the spring. Mule deer browse and graze, preferring the new growth of shrub vegetation, forbs, and grasses typical of early successional habitats that follow disturbances such as fire or logging. Following disturbance, grasses and forbs are the first species to become established, then shrubs and other woody vegetation, which often provide succulent food for deer. In forested areas, slower growing and taller pines or firs eventually out-compete most other plants.

Forage preferences vary by availability, quality, and season. In the Sierra Nevada, deer prefer early to midsuccessional forests, woodlands, and riparian and brush habitats because of the greater diversity of shrubby vegetation and woody cover. In addition to forage, vegetative cover is critical for thermoregulation. Suitable habitat includes a mosaic of vegetation including forest or meadow openings, dense woody thickets and brush, edge habitat, and riparian areas. Fawning habitat, used by does during birth and by newborn fawns, is critical to reproductive success. A diversity of thermal cover, hiding cover, succulent forage, and water are needed during fawning (USFS 1982). Optimal deer fawning habitat has been described as having moderate to dense shrub cover near forest cover and water, such as riparian zones (Leckenby et al. 1982, USFS 1982). A source of surface water (e.g., creek or river) is especially important to mule deer (Leckenby et al. 1982; Zeiner et al. 1990). Typical fawning habitat varies in size, but an area of 5–26 acres is adequate, with optimal fawn-rearing habitat of around 400 acres (Leckenby et al. 1982).

The following habitat descriptions come from *Deer Habitats in California* (USFS 1982). In winter deer use a patchy mosaic of dense cover (>3 feet tall) for finding shelter and browsing, interspersed with open foraging areas with grasses and forbs. Shelter is needed to minimize environmental stresses during a season when deer rely on fat reserves stored during summer and fall to supplement the food that is available. In spring deer move toward their summer ranges. All deer, and especially pregnant females, depend on abundant new herbaceous growth, particularly perennial grasses, to replenish tissue reserves while migrating. Cover is not as critical as during winter, but is still important for escaping from predators.

Summer habitat needs to provide a rich mix of forage plants to nourish fawns and meet their requirements for growing and storing energy. Cover is especially important to fawns, which hide in, or escape from, predators in dense but penetrable thickets and brush fields or tall herbaceous vegetation. Water sources should be available within one-quarter to one-half mile of forage and cover; lack of water may preclude the use of otherwise suitable habitat. Small patches of brush fields interspersed with mature forest near water provide good summer habitat.

In fall deer return to their winter range. During this season fawns are growing and deer need to store energy for the winter. Cover is important for escape from predators and for protection during the hunting season. Inadequate cover may cause deer to avoid otherwise desirable foraging areas. Patches of cover should be greater that 20 acres and open enough or with trails to allow easy movement. Stands of large shrubs with little to no tree canopy provide particularly good forage, and perennial grasses, if still green, are also important.

Aspen groves are an early successional habitat that is very important to migratory deer, providing good cover and forage near water. After being disturbed, groves can regenerate rapidly through root suckering; however, groves are declining because of aggressive fire suppression and heavy livestock grazing. Much of the deer winter ranges of the Loyalton-Truckee deer herd is not forested habitat but is in more low-lying areas dominated by sagebrush, bitterbrush, and agricultural fields. Forage on the wildlife areas is mostly provided by bitterbrush, sagebrush, mountain mahogany, and perennial grasses. Cover is mostly provided by juniper and Jeffery pine. A small amount of willow scrub and aspen also provides important forage and cover near perennial creeks. Water is available in creeks and at several springs on the wildlife areas, including several springs on steep slopes away from creeks.

The primary limiting factor for deer at AVWA and SCWA is lack of quality forage. Recent management of forage includes a timber harvest in 1999–2001 to open the canopy, remove small conifers that compete with forage plants, and encourage bitterbrush and mountain mahogany growth. The harvest successfully opened the canopy and promoted growth of shrubs, but results would have been improved with some seeding and planting of bitterbrush and mountain mahogany (Lidberg, pers. comm., 2007). In the mid 1980s about 1.5 miles of Antelope Valley Creek was fenced to protect it from overgrazing. Bitterbrush responded well within, but not outside of, the fenced area. Grazing outside the fence was restricted in 2003 and bitterbrush there subsequently improved.

The effects of fire on vegetation types, including those used by deer, are described in Section 3.3.1, "Vegetation," of this chapter. Regeneration of forage plants after severe fires can be slow. The Cottonwood and Harding fires burned substantial areas on AVWA and SCWA. Following these fires, bitterbrush was planted and seeded to improve deer forage in AVWA, with varying success. Success was likely related to soil moisture and could be improved by planting in protected areas (e.g. near slash piles) and in the fall (Lidberg, pers. comm., 2007). Mountain mahogany showed almost no natural recruitment after the fires, either in areas that were grazed or ungrazed, even where good seed banks were present.

According to the wildlife area manager, AVWA has recently started providing year-round habitat for deer, including fawning habitat (Lidberg, pers. comm., 2007). Relatively recent fires and timber harvest may have benefited shrub communities on the wildlife areas, improving overall deer habitat and encouraging year-round use. Recruitment of fawns has long been a management concern for the Loyalton-Truckee deer herd (Department 1982), and continues to be a concern at the wildlife areas. Several efforts have benefited aspen at the wildlife areas: riparian fencing to exclude cattle from Antelope Valley Creek and aspen restoration projects to remove conifers encroaching on aspens stands.

Deer mortality at the wildlife areas is caused by predation, disease, and legal and illegal hunting. Predation (mostly by mountain lions, with additional predation on young by coyotes and bears) and disease are not substantial deer management concerns at the wildlife areas (Lidberg, pers. comm., 2007). The wildlife areas provide limited entry, high quality trophy hunting, and so legal hunting mortalities are low. Illegal hunting, while it undoubtedly occurs, is probably not a management concern for deer (Lidberg, pers. comm., 2007). Outside of the wildlife areas, vehicle collisions are a substantial cause of mortality for the Sierra Valley subunit of the deer herd.

Other Mammals

Habitat at the wildlife areas supports a variety of mammal wildlife species in addition to deer. A study of mountain lion (*Felis concolor*) in Sierra County conducted in the late 1980s and early 1990s tracked mountain lions by radio throughout the wildlife areas (Department unpublished data), and tracks are commonly seen in mud on Antelope Valley Creek, but not at other locations (Lidberg, pers. comm., 2007). Coyote (*Canis latrans*) and black bear (*Ursus americanus*) are among the other larger mammals occurring at the wildlife areas.

Thirteen species of bat have been captured or detected on or near Antelope Valley Creek (Szewczak, pers. comm., 2007), consisting of spotted bat (*Euderma maculatum*), free-tailed bat (*Tadarida brasiliensis*), pallid bat (*Antrozous pallidus*), big brown bat (*Eptesicus fuscus*), western red bat (*Lasiurus blossevillii*), silver-haired bat

(*Lasionycteris noctivagans*), hoary bat (*Lasiurus cinereus*), California myotis (*Myotis californicus*), small-footed myotis (*Myotis ciliolabrum*), long-eared myotis (*Myotis evotis*), fringed myotis (*Myotis thysanodes*), hairy-winged myotis (= long-legged myotis) (*Myotis volans*), and Yuma myotis (*Myotis yumanensis*). Most of these species were detected while they were foraging over or in riparian habitat, although bats roost in all habitats found at the wildlife areas. Bat use and activity of a site may be useful indicators of habitat changes, such as those following restoration efforts (Szewczak 2004). A study of bat use at a riparian restoration project in the Sierra Valley watershed about 8 miles northwest of AVWA showed an increase in bat use following a "plug and pond" restoration project (Szewczak 2004), which could indicate improvements to the riparian vegetation.

Upland and riparian vegetation types at the wildlife areas have the potential to support additional terrestrial mammal species, such as black-tailed jack rabbit (*Lepus californicus*), snowshoe hare (*Lepus americanus*), mountain cottontail (*Sylvilagus nuttallii*), deer mouse (*Peromyscus maniculatus*), and Allen's and yellow-pine chipmunks (*Neotamias senex* and *N. amoenus*).

Birds

The riparian, shrub and coniferous forest vegetation types found at the wildlife areas support a diversity of migratory and resident bird species. Groups that use the wildlife area include upland game species, raptors, and neotropical migratory birds. Birds are of increasing interest to wildlife watchers at the wildlife areas.

Upland Game Birds

Upland and riparian vegetation types in the wildlife areas provide habitat for several upland game birds, although few hunters use the wildlife areas for these species. The primary upland game bird species that uses the wildlife areas are mountain quail (*Oreortyx pictus*) and mourning dove (*Zenaida macroura*).

Raptors

A few species of hawks and falcons regularly use the wildlife areas. Breeding raptors tend to be sensitive to disturbance at nest sites. Red-tailed hawk (*Buteo jamaicensis*) is the most common and builds stick nests in trees or on tall structures in open habitats. One pair of northern goshawk (*Accipiter gentilis*) is known to nest in closed canopy forest at the wildlife areas. Peregrine falcons (*Falco peregrinus*) are know to nest in the vicinity and may forage at the wildlife areas. Prairie falcons (*Falco mexicanus*) are routinely seen during the breeding season and may nest on rocky cliffs in or near the wildlife areas. Swainson's hawks (*Buteo swainsoni*) nest in Sierra Valley, but do not use the wildlife areas with any regularity.

Neotropical Migratory Birds

Many species of neotropical migratory birds migrate through or breed in the Sierra Nevada, including at the wildlife areas. Neotropical migratory birds are species that breed in North America and winter in Central and South America. Representative species that breed and/or migrate through the area include western wood-pewee (*Contopus sordidulus*), tree swallow (*Tachycineta bicolor*), barn swallow (*Hirundo rustica*), Bullock's oriole (*Icterus bullockii*), Wilson's warbler (*Wilsonia pusilla*), and yellow warbler (*Dendroica petechia*).

Population levels for many neotropical migratory birds are declining, especially those that breed in riparian habitats. Primary causes of these declines have been habitat loss and fragmentation, together with increased nest parasitism by cowbirds. Conservation of existing habitat and restoration of additional suitable riparian habitat at the wildlife areas would contribute to maintaining healthy neotropical migrant bird populations.

Neotropical migrants comprise a high proportion of riparian bird communities in the Sierra Nevada. Riparian bird species that collectively represent a broad range of specific habitat associations include song sparrow (*Melospiza melodia*), MacGillivray's warbler (*Oporornis tolmiei*), Wilson's warbler (*Wilsonia pusilla*), yellow warbler (*Dendroica petechia*), and warbling vireo (*Vireo gilvus*). Species composition in a particular location depends on

vegetation composition, structure, patch size, and hydrologic characteristics. In the Sierra Nevada, in general, primary limiting factors to the distribution and persistence of riparian habitats that can function as songbird population sources and support a diverse avian community are surface wetness and soil saturation within the riparian or meadow zone. For example, breeding productivity of several riparian songbird species (e.g., willow flycatcher) increases with the extent and duration of soil saturation or standing/slow-moving water in meadows or wide riparian corridors.

Preliminary results from a riparian plug and pond restoration project in Carman Valley, about 8 miles northwest of AVWA, indicate good success at improving habitat for riparian birds. Song sparrow, MacGillivray's warbler, and yellow warbler populations responded positively in the first 2 years following the project (SFSU 2007). Studies at that site were planned through 2007; results of the project should be useful for planning and monitoring any riparian restoration projects at the wildlife areas.

SPECIAL-STATUS WILDLIFE SPECIES

Special-status wildlife species are legally protected or are otherwise considered sensitive by federal, state, or local resource conservation agencies and organizations. Special-status wildlife species addressed in this section include:

- species listed as threatened or endangered under the federal or state Endangered Species Acts,
- species identified by the U.S. Fish and Wildlife Service (USFWS), the Department, or USFS as species of special concern, and
- species fully protected in California under the California Fish and Game Code.

Table 3.3-4 includes 17 special-status wildlife species that are known or have potential to occur within 5 miles of the wildlife areas, or could be affected by projects there. Exhibit 3.3-3 displays the occurrences of these species within 1 mile of the wildlife area that have been recorded by the CNDDB (2007). The table also provides information on each species' regulatory status, habitat requirements, and potential for occurrence at the wildlife areas.

For some of the species in Table 3.3-4, the wildlife areas do not contain suitable habitat, nor is suitable habitat likely to result from restoration efforts. The wildlife areas could, however, provide habitat for 18 of the species listed in Table 3.3-4.

Table 3.3-4
Sensitive Wildlife Species with Potential to Occur in the Antelope Valley and Smithneck Creek Wildlife Areas

Species	Status[1]		Habitat	Potential for Occurrence
	Federal	State		
Amphibians				
Mountain yellow-legged frog *Rana muscosa*	C,S	SSC	Open lake and stream margins, especially where predatory fish are absent. Occurs in the Sierra Nevada of California from about 4,500 to 12,000 feet from Plumas to Tulare Counties.	Unlikely to occur. Predators are present. Efforts to locate this species in the wildlife areas have been unsuccessful (Hiscox and Urich, pers. comm., 2007).
Birds				
Northern goshawk *Accipiter gentilis* (nesting)	–,S	SSC	Nests in mid- to high-elevation coniferous forest.	Known to occur. Documented nesting from 1998 through 2005; nest territory is presumed still active (Lidberg, pers. comm., 2007).

Table 3.3-4
Sensitive Wildlife Species with Potential to Occur in the Antelope Valley and Smithneck Creek Wildlife Areas

Species	Status[1]		Habitat	Potential for Occurrence
	Federal	State		
Golden eagle *Aquila chrysaetos*	–	FP	Nests on cliffs of all heights and in large trees in open areas.	Could occur. EDAW staff observed a golden eagle near the Smithneck Creek Wildlife Area (SCWA) during a reconnaissance survey in November 2006.
Swainson's hawk *Buteo swainsoni*	–	T	Nests in riparian woodlands and isolated trees; forages in grasslands, shrublands and agricultural fields.	Could occur. Breeds in Sierra Valley in spring and summer, and has been observed at the mouth of Antelope Valley. No breeding habitat on Antelope Valley Wildlife Area (AVWA) or S CWA (Lidberg, pers. comm., 2007).
Olive-sided flycatcher *Contopus cooperi* (nesting)	–	SSC	Nests in montane conifer forest; forages in conifer forest, adjacent meadows and clearings.	Could occur. The wildlife areas are within the range of the species and provide suitable habitat.
Yellow warbler *Dendroica petechia brewsteri* (nesting)	–	SSC	Breeds in deciduous riparian vegetation in open canopy woodland and forest.	Known to occur. Occurs regularly and is presumed to breed, especially on Antelope Valley Creek.
Willow flycatcher *Empidonax traillii* (nesting)	–,S	E	Nests in open shrub thickets in moist meadows near slow or still water.	Unlikely to occur. Moist meadow habitat with slow or still water is absent. Species breeds 5-8 miles south of wildlife areas on Cottonwood Creek and Little Truckee River.
Peregrine falcon *Falco peregrinus*	D,S	FP	Nests on high cliffs near wetlands, rivers and lakes.	Could occur. Known to nest near the wildlife areas and may forage at the wildlife areas.
Greater sandhill crane *Grus canadensis*	–,S	T,FP	Grassland, croplands with corn or rice stubble, and open wetlands.	Could occur September–April. Known to occasionally use Bear Valley Creek Unit, but not for breeding (Lidberg, pers. comm., 2007). Breeds in Sierra Valley.
Bald eagle *Haliaeetus leucocephalus*	D	E,FP	Nests on tall trees or structures near lakes, reservoirs, and rivers; forages in marshes and wet meadows.	Could occur. Unlikely to breed but occurs in Sierra Valley during migration and winter, and occasionally observed at Palen Reservoir (CAL FIRE 1996).
Loggerhead shrike *Lanius ludovicianus* (nesting)	–	SSC	Breeds mainly in shrubland and open woodland with grass cover and areas of open ground.	Could occur. Sierra Valley is within range and suitable habitat is available.
Great gray owl *Strix nebulosa* (nesting)	–,S	E	Ungrazed montane meadows with dense coniferous forest containing snags and broken topped trees.	Unlikely to occur. Documented historically within about 7 miles of Antelope Valley, but the wildlife areas do not contain suitable habitat.
Mammals				
Pallid bat *Antrozous pallidus*	–,S	SSC	Most common in open, dry habitats with rock areas such as deserts, grasslands, shrublands.	Known to occur. Males and lactating females were captured on AVWA in 1998 and 1999 (CNDDB 2007b).

Table 3.3-4
Sensitive Wildlife Species with Potential to Occur in the Antelope Valley and Smithneck Creek Wildlife Areas

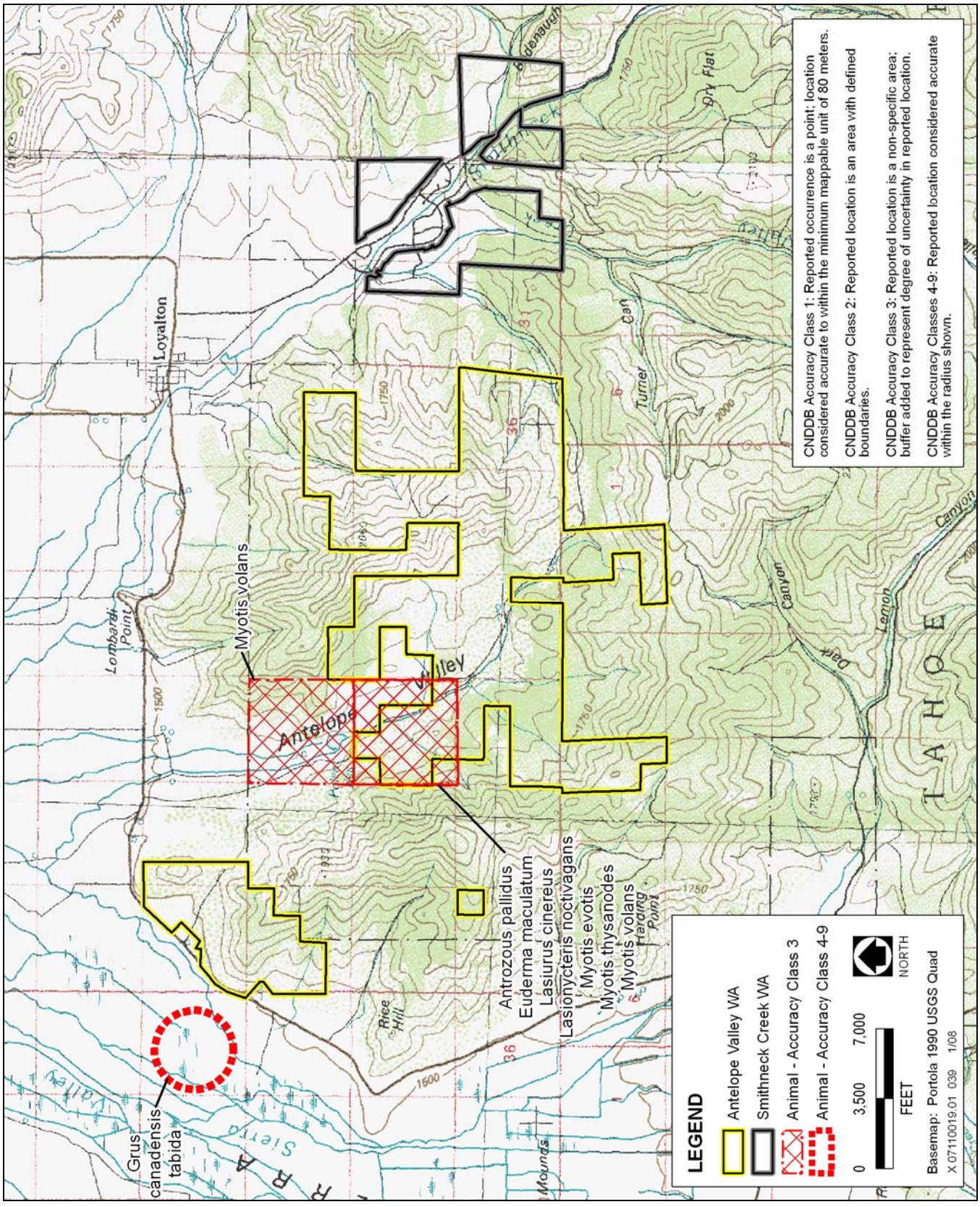
Species	Status[1]		Habitat	Potential for Occurrence
	Federal	State		
Sierra Nevada mountain beaver *Aplodontia rufa californica*	–	SSC	Typically occur in montane riparian habitat with dense deciduous vegetation and open, brushy forest.	Could occur. The wildlife areas provide potentially suitable habitat, but the species has not been documented there.
Townsend's big-eared bat *Corynorhinus townsendii*	–,S	SSC	Widespread, but most common in moist sites; typically roosts in caves and mines.	Known to occur. Species has been detected on AVWA (Szewczak, pers. comm., 2007)
Spotted bat *Euderma maculatum*	–	SSC	Roosts and may breed in rock crevices; feeds over water.	Known to occur. Foraging bats have been detected on AVWA (Szewczak, pers. comm., 2007)
western mastiff bat *Eumops perotis*	–	SSC	Broadly distributed in open, semiarid to arid habitats; roosts in high rock faces or similar features.	Known to occur. Species has been detected on AVWA (Szewczak, pers. comm., 2007)
California wolverine *Gulo gulo*	–,S	T,FP	Usually inhabits open terrain above timberline; may occur at lower elevations.	Unlikely to occur. Species undocumented in California for decades with the exception of one nearby sighting in 2007.
Western red bat *Lasiurus blossevillii*	–	SSC	Widespread, frequents riparian habitats; roosts primarily in trees.	Known to occur. Species has been detected on AVWA (Szewczak, pers. comm., 2007)
Sierra Nevada showshoe hare *Lepus americanus tahoensis*	–	SSC	Riparian communities with thickets of deciduous trees and shrubs; adjacent dense thickets of young conifers and chaparral	Could occur. The wildlife areas provide potentially suitable habitat, but the species has not been documented there.
Sierra marten *Martes americana sierrae*	–,S	–	Mixed evergreen forests with more than 40% crown closure, with large trees and snags; variety of different-aged stands, old-growth conifers and snags with abundant cavities.	Unlikely to occur. The wildlife areas are within the range of the species, but fires have reduced availability of different aged stands and old-growth conifers.
Fisher (=Pacific Fisher) *Martes pennanti* (=*Martes pennanti pacificus*)	C,S	SSC	Dense stands in mixed conifer forests composed of Douglas fir and associated conifers; higher elevation fir and pine forests.	Unlikely to occur. No dense conifer stands occur in the wildlife areas. This species is rarely observed between Mt. Shasta and Yosemite National Park.
American badger *Taxidea taxus*	–	SSC	Friable soils and relatively open, uncultivated ground.	Could occur. The wildlife areas provide suitable habitat, but the species has not been documented there.
Sierra Nevada red fox *Vulpus vulpus necator*	-,S	T	Uses dense vegetation and rocky areas for cover and den sites. Hunts in grassland and other open areas.	Could occur. The wildlife areas are within the range of the species and provide suitable habitat.

[1] Legal Status Definitions

U.S. Fish and Wildlife Service Federal Listing Categories:
- E Endangered (legally protected)
- T Threatened (legally protected)
- D Recently de-listed from Endangered Species List
- C Candidate for listing
- S Considered Sensitive by the US Forest Service

California Department of Fish and Game State Listing Categories:
- E Endangered (legally protected)
- T Threatened (legally protected)
- FP Fully Protected (legally protected, no take allowed)
- SSC Species of Special Concern (no formal protection)

Source: CNDDB 2007b, USFWS 2007, USFS 2001, Szewczak, pers. comm.. 2007



Source: CNDDB 2007a, Department 2007, USFS 2006

CNDDB Wildlife Occurrences within 1 Mile of the Antelope Valley and Smithneck Creek Wildlife Areas **Exhibit 3.3-3**

Although just a few of these special-status species have been recorded using the wildlife areas in recent years, their presence cannot be discounted because biological surveys for these species may not have been conducted in the wildlife areas. Consequently, for each of the species that could occur or is known to occur the following text provides additional information regarding their life history, habitat requirements, and the likelihood of their presence. The reasons for population declines and general management and restoration actions are also described.

Northern Goshawk

In the Sierra Nevada, northern goshawk breeds at elevations from approximately 2,500 feet in the ponderosa pine/mixed-conifer vegetation types through approximately 10,000 feet in the red fir and lodgepole pine vegetation types, and throughout eastside pine forests on the east slope (Bloom et al. 1986). Additionally, northern goshawk nests in aspen stands occurring in shrub vegetation types on the eastern slope of the Sierra Nevada (Bloom et al. 1986). Northern goshawk is suspected to be a year-round resident throughout the Sierra Nevada, although some limited seasonal altitudinal movements may occur.

In general, northern goshawk requires mature conifer and deciduous forests with large trees, snags, downed logs, dense canopy cover, and open understories for nesting. Goshawk foraging habitat includes forests with dense to moderately open overstories and open understories interspersed with meadows, brush patches, riparian areas, or other natural or artificial openings. High canopy cover is the most consistent structural characteristic among studies of northern goshawk nesting habitat. High canopy cover may indicate northern goshawk habitat because of the presence of large trees for nest sites, a closed canopy for protection from predators and thermal cover, and open understories that provide for maneuverability and detection of prey below the canopy.

A nest territory was identified at AVWA (CAL FIRE 1996). The nest was protected by restricting logging from within a nest buffer during timber harvest in 1999–2001, and is known to have remained active through 2005. Although it has not been checked in recent years, the territory is presumed to still be active (Lidberg, pers. comm., 2007).

Golden Eagle

Golden eagle (*Aquila chrysaetos*) is an uncommon permanent resident and migrant throughout California, except in the center of Central Valley. It uses rolling foothills and mountain terrain, wide arid plateaus deeply cut by streams and canyons, open mountain slopes, and cliffs and rock outcrops. Golden eagles nest on cliffs of all heights and in large trees in open areas. It builds large platform nest of sticks, twigs, and greenery. Rugged, open habitats with canyons and escarpments are used most frequently for nesting. This raptor eats mostly rabbits and rodents, but also takes other mammals, birds, reptiles, and some carrion. It needs open terrain for hunting: grasslands, deserts, savannahs, and early successional stages of forest and shrub habitats (California Interagency Wildlife Task Group 2005).

In November 2006, EDAW biologists observed a golden eagle sitting in the pasture along Smithneck Road, just north of Sierra Brooks.

Swainson's Hawk

Swainson's hawk (*Buteo swainsoni*) typically breeds in California during March through September and winters primarily in Mexico (Central Valley breeders) and Central and South America (Great Basin breeders). Swainson's hawk usually nest in riparian areas and prefer to nest in large trees with a panoramic view of foraging habitat. Foraging habitats are grasslands and agricultural fields that have accessible prey.

They are known to breed in Sierra Valley, but not at the wildlife areas. Swainson's hawks could occasionally forage in grasslands or meadows at the wildlife areas, but these areas do not provide a substantial amount of foraging habitat, especially when compared to the agricultural lands present in Sierra Valley.

Olive-sided Flycatcher

Olive-sided flycatcher *(Contopus cooperi)* is a summer resident in a wide variety of forest and woodland habitats below 2800 m (9000 ft) throughout California exclusive of the deserts, the Central Valley, and other lowland valleys and basins. Preferred nesting habitats include mixed conifer, montane hardwood-conifer, Douglas-fir, redwood, red fir, and lodgepole pine. It requires large, tall trees, usually conifers, for nesting and roosting sites, and openings in the forest for foraging. Olive-sided flycatchers also require high perches, typically the dead tips or uppermost branches of the tallest trees in vicinity, for singing posts and hunting perches. (California Interagency Wildlife Task Group 2005).

Yellow Warbler

As a neotropical migrant, yellow warbler inhabits California from April to October (Zeiner et al. 1990). During these months, yellow warbler primarily uses underbrush of riparian woodlands for foraging and nesting. It forages for insects and spiders by gleaning and hovering in the crowns of trees and shrubs. Its nest is an open cup in a tree or shrub. The home range of yellow warbler is less than an acre.

Riparian areas at the wildlife areas provide potential nesting and foraging habitat for yellow warbler. Restoring additional riparian vegetation, and enhancing existing habitat would increase the likelihood of yellow warbler nesting at the wildlife areas. SFSU (2007) reports that a yellow warbler population began to increase within 2 years of a riparian restoration project a few miles from AVWA, even while populations at a control site declined.

Willow Flycatcher

In the Sierra Nevada, breeding habitat typically consists of moist montane meadows that support riparian deciduous shrubs (particularly willows) and remain wet through midsummer. Wet meadows provide a concentrated source of flying insect prey required for successful breeding and rearing of young. Willow flycatcher (*Empidonax trailli)* displays and forages from perches and requires some openings in the vegetation; in mountain meadows, willow flycatcher typically uses willow thickets interspersed with open space for breeding, but avoids large, contiguous thickets (Craig and Williams 1998).

Nesting sites in California are usually near slow moving streams, standing water, or seeps (Zeiner et al. 1990). However, willow flycatcher may place nests far away from water (e.g., where river channels or subsurface flows have been modified), as long as the site continues to support riparian vegetation (Sogge et al. 1997, cited in Craig and Williams 1998). Very little suitable habitat exists at the wildlife areas. Downcutting (a geological process that deepens the channel of a stream or valley by removing material from the stream's bed or the valley's floor) in Antelope Valley and Bear Valley creeks has reduced the water table and dried out adjacent meadows, and riparian vegetation is very limited.

No willow flycatchers have been recorded at the wildlife areas. They have been observed annually at a riparian area adjacent to a downcut stream in Carman Valley, about 8 miles from AVWA, where they have unsuccessfully attempted to breed (SFSU 2007). There is a 2004 breeding record from Cottonwood Creek, less than 5 miles south of AVWA, and numerous recent breeding records from the Little Truckee River within 10 miles of the wildlife areas, and within 15 miles on the Feather River (CNDDB 2007b).

Peregrine Falcon

Peregrine falcon (*Falco peregrinus*) breeds near wetlands, lakes, rivers, or other water on high cliffs, banks, dunes, and mounds. Its nest is a scrape on an open depression or ledge. Peregrine falcon may also nest on human-made structures, and occasionally uses tree or snag cavities or old nests of other raptors. When foraging, the peregrine falcon dives onto flying prey, chases in flight, and rarely hunts from a perch. It usually captures a variety of birds up to ducks in size and occasionally takes non-avian prey. It breeds mostly in woodland, forest,

and coastal habitats. Riparian areas and coastal and inland wetlands are important habitats yearlong, especially in nonbreeding seasons.

Peregrine falcon population declined drastically in the 60's and 70's, associated mostly with dichloro-diphenyl-dichloroethylene (DDE) contamination, which caused thinning of the egg shell. DDE is a breakdown product of the insecticide dichloro-diphenyl-trichloroethane (DDT), which was banned in the United States in 1972. Since then, the peregrine falcon population has rebounded, which led to removal from the federal endangered species list in 1999 (California Interagency Wildlife Task Group 2005).

Peregrine falcons nest near the wildlife areas and could use the wildlife areas for foraging. Peregrine falcons also migrate through the Sierra Valley in fall.

Greater Sandhill Crane

The greater sandhill crane (*Grus canadensis*) nests in northeastern California and Oregon and is found throughout most of the Central Valley in winter. Vegetation types used by the sandhill crane include seasonal and freshwater emergent wetlands, grasslands, and agricultural lands. Generally, crane breeding habitat consists of wet meadows, often interspersed with emergent marsh. California birds tend to nest in rather open habitat. The greater sandhill crane population has declined primarily as a result of loss of suitable wetland nesting habitats. Other major factors adversely affecting the species include disturbance associated with human activities, illegal harvest, and predation.

Greater sandhill cranes breed in Sierra Valley. They have been observed on the Bear Valley Creek Unit, but do not breed there (Lidberg, pers. comm., 2007). It is unlikely that wet meadow restoration activities would provide open breeding habitat for the species.

Bald Eagle

Bald eagle (*Haliaeetus leucocephalus*) nest sites are always associated with bodies of water, usually lakes and rivers that support abundant fish, waterfowl, or other waterbird prey. Nest trees are usually found within about a mile of water and are typically in mature and old-growth conifer stands (Buehler 2000). Nest trees usually have an unobstructed view of a water body and are usually one of the largest trees in a stand. Snags and dead-topped live trees are important for perch and roost sites. Bald eagle winters along rivers, lakes, or reservoirs that support abundant fish or waterbird prey and that have large trees or snags for perch or roost sites. Bald eagle typically forages in waters less than one-quarter mile from perching habitat.

Bald eagles are seen rarely throughout the year in the Sierra Valley (SFSU 1996). They migrate through the valley, and may occur during winter, but breeding pairs have not been documented there (CNDDB 2007b). According to a 1996 THP prepared for AVWA, bald eagles are occasionally seen at Palen Reservoir.

Loggerhead Shrike

Loggerhead shrike (*Lanius ludovicianus*) is a common resident and winter visitor in lowlands and foothills throughout California. Prefers open habitats with scattered shrubs, trees, posts, fences, utility lines, or other perches. This species requires thorny shrubs, barbed-wire fences or other pointy objects to skewer its prey of (mostly) large insects, or small birds, mammals, amphibians, reptiles, fish, carrion, and various other invertebrates. The highest density of loggerhead shrikes occurs in open-canopied valley foothill hardwood, valley foothill hardwood-conifer, valley foothill riparian, pinyon-juniper, juniper, desert riparian, and Joshua tree habitats. In the Great Basin, from Inyo Co. north, the population declines markedly from November through March (California Interagency Wildlife Task Group 2005).

In California, loggerhead shrikes breed mainly in shrublands, open woodlands with a fair amount of grass cover and areas of bare ground. There has been an apparent increase in the abundance in northeastern California. Loggerhead shrike is a rare breeder in the Sierra Valley (Humple 2008)

Western Red Bat

Western red bat (*Lasiurus blossevillii*) is widely distributed throughout California (Pierson et al. 2004). Apparently, breeding females are confined to low elevation riparian habitats, although western red bats (most likely males) have been detected above 8,000 feet (Pierson et al. 2004). Western red bats feed over a wide variety of habitats including grasslands, shrublands, open woodlands and forests, and croplands. This species roosts primarily in trees, less often in shrubs. Roost sites often are in edge habitats adjacent to streams, fields, or urban areas.

Roosts may be from 2 to 40 feet above ground level. Females and young may roost in higher sites than males. Family groups roost together. Nursery colonies are found with many females and their young (California Interagency Wildlife Task Group 2005)

Western red bats have been detected near Antelope Valley Creek (Szewczak, pers. comm., 2007) and at Carman Valley.

Pallid Bat

Pallid bat prefers to use rocky outcrops, cliffs, and crevices with access to open habitats for foraging in a wide variety of habitats, including grasslands, shrublands, woodlands, and forests. It roosts in caves, crevices, mines, and occasionally in hollow trees and buildings during the day and may use more open roosts at night. Rock crevices are probably used for hibernation (California Interagency Wildlife Task Group 2005).

Pallid bat often takes large insect prey from the ground or vegetation and rarely feed in flight (Szewczak 2004). They have been documented near Antelope Valley Creek at AVWA (Szewczak, pers. comm., 2007, CNDDB 2007b).

Sierra Nevada Mountain Beaver

Sierra Nevada mountain beaver (*Aplodontia rufa californica*), or sewellel, uses riparian habitats with soft, deep soils for burrowing, lush growth of preferred food sources such as willow and alder, and a variety of herbaceous species for bedding material. Vegetation types include wet meadows and willow and alder dominated riparian corridors, typically near water sources. Mountain beaver is generally solitary, except during its short breeding system, and spends a high proportion of its time in extensive underground burrow systems with multiple openings, tunnels, and food caches. (Carraway and Verts 1993; Steele 1982). Sierra Nevada mountain beaver populations are localized and uncommon. The species has not been documented at the wildlife areas, but habitat may be suitable where soils are deep and friable. Riparian restoration projects could improve habitat for the species.

Townsend's Big-Eared Bat

Townsend's big-eared bat prefers moist habitats, where it gleans insects from brush or trees or feeds in the air along habitat edges throughout California. The species roosts in caves, mines, tunnels, buildings, or other human-made structures. It may use separate sites for night, day, hibernation, or maternity roosts and may roost with other species. Compared with other species, it is considered to be extremely sensitive to disturbance at its roosting site (California Interagency Wildlife Task Group 2005).

Spotted Bat

Spotted bat prefers sites with adequate roosting habitat, such as cliffs, and feeds over water and along washes. It prefers to roost in rock crevices, and is occasionally found in caves and buildings. Cliffs provide optimal roosting habitat (California Interagency Wildlife Task Group 2005). It forages over open marshes, fields, and riparian corridors (Barbour and Davis 1969; Wai-Ping and Fenton 1989; Szewczak et al. 1998, cited in Szewczak 2004). Spotted bat preys almost exclusively on moths.

Spotted bats have been detected over Antelope Valley Creek (Szewczak, pers. comm., 2007).

Western Mastiff Bat

Western mastiff bat (*Eumops perotis*) occurs uncommonly in many open, semi-arid to arid habitats. It uses crevices in cliff faces, high buildings, trees, and tunnels for roosting, where vertical faces allow it to drop off to take flight (California Interagency Wildlife Task Group 2005). The wings of western mastiff bat are distinctively long and narrow. Such morphology allows for rapid, sustained flight, but limits maneuverability (California Interagency Wildlife Task Group 2005); it must use ponds greater than 100 feet long for drinking (Szewczak 2004). It is likely that mastiff bat could seasonally roost in cliff faces around the Sierra Valley (Szewczak 2004).

Western mastiff bats have been detected over Antelope Valley Creek (Szewczak, pers. comm., 2007).

Sierra Nevada Showshoe Hare

Sierra Nevada showshoe hare (*Lepus americanus tahoensis)* is an uncommon resident at upper elevations throughout the northern and central Sierra Nevada. In California it is mostly found in dense cover in montane riparian habitats with thickets of alders and willows, and in stands of young conifers interspersed with chaparral. The early seral stages of mixed conifer, subalpine conifer, red fir, Jeffrey pine, lodgepole pine, and aspen are likely habitats primarily along edges and especially near meadows and riparian habitats. It may also be found in areas with young firs with branches drooping to ground and in patches of ceanothus and manzanita within, or bordering, fir or pine forests (California Interagency Wildlife Task Group 2005).

American badger

American badger (*Taxidea taxu) is* an uncommon resident of herbaceous, shrub, and open stages of most habitats with dry, friable soils. This species burrows for cover in friable soils and frequently reuse old burrows (California Interagency Wildlife Task Group 2005). Badgers are not known to exist in the wildlife areas, but could occur there (Lidberg, pers. comm., 2007).

Sierra Nevada Red Fox

The native subspecies of the red fox *(Vulpus vulpus necator)* is found in the Cascades in Siskiyou County, and from Lassen County south to Tulare County. Introduced populations of the red fox inhabit Sacramento and San Joaquin valleys and scattered coastal and inland locations. Native Sierra Nevada populations may be found in a variety of habitats, including alpine dwarf-shrub, wet meadow, subalpine conifer, lodgepole pine, red fir, aspen, montane chaparral, montane riparian, mixed conifer, and ponderosa pine. Jeffrey pine, eastside pine, and montane hardwood-conifer are also used.

The red fox hunts small and medium-sized mammals, ground squirrels, gophers, mice, marmots, woodrats, pikas, and rabbits. Other vertebrates, insects, carrion, fruits, and earthworms are used occasionally and carrion is important in winter. Sierra Nevada red fox prefers forests interspersed with meadows or alpine fell-fields. Open areas are used for hunting, forested habitats for cover and reproduction. Sierra Nevada red foxes are rare, and numbers may be continuing to decline (California Interagency Wildlife Task Group 2005). Although the Sierra

Nevada red fox has not been reported from the wildlife areas, this species could occur there, because the wildlife areas are within its range and support suitable habitat.

3.3.3 FISHERIES AND AQUATIC RESOURCES

The wildlife areas contain a number of streams and creeks that flow into the Sierra Valley; the most prominent being Antelope Valley, Smithneck, Bear Valley, and Badenaugh Creeks. These streams support healthy aquatic ecosystems and provide essential water to the surrounding terrestrial ecosystem. Changing land uses in the region have altered the aquatic ecosystems, resulting in the incision of stream channels and the disappearance of associated wetland marsh floodplain. The effects have largely been caused by grazing, logging, wildfires, road construction, and water diversion. In addition, the introduction and/or spread of nonnative species have altered the aquatic communities of the wildlife areas.

AQUATIC ECOSYSTEM PROCESSES

Primary environmental patterns that influence aquatic ecosystems include hydrology, topography and geology, and soils/sediments. In the wildlife areas' watersheds, all of these patterns combine to support geomorphic processes that create, maintain, or change aquatic habitats, which in turn govern the type of aquatic communities present.

Streamflow patterns in particular play a large role in aquatic communities and are governed by precipitation, snowpack and runoff, temperature, and groundwater. The formation and maintenance of habitat types (e.g., pool, riffle, run) and substrate composition are directly influenced by streamflow patterns and associated fluvial geomorphic processes. In the streams that flow through the wildlife areas, aquatic communities are also heavily influenced by sediment deposits from upstream sources and by large woody debris (LWD).

Aquatic communities are shaped by streamflow patterns, topography, and LWD inputs which influence the abundance and types of organisms present in the streams. Both the flow needs for sustaining fisheries and other aquatic life and the amount, timing, and variability of flow are important in relation to the overall function of the stream ecosystem. Salmonids, such as the rainbow trout (*Oncorhynchus mykiss*) and brown trout (*Salmo trutta*), require sufficient flows (and cold temperatures) to cue spawning and to provide spawning habitat. Eggs require clean gravel and sufficient flows during the incubation period to prevent egg exposure to freezing or desiccation and to provide necessary water quality and temperature conditions. Rearing juveniles and adults both require flows necessary to maintain suitable water temperatures and dissolved oxygen concentrations. Aquatic macroinvertebrate communities, an important trophic link in aquatic ecosystems, require appropriate streamflows, water quality, and substrate conditions.

AQUATIC FOOD WEB

The primary energy input to aquatic ecosystems is solar radiation, which is used along with nutrients by the primary producers (e.g., phytoplankton, vascular plants, and macroalgae) to convert inorganic carbon and nutrients to organic matter through photosynthesis. Therefore, productivity is generally increased in summer months. Vascular plants and macroalgae are grazed on and also produce detritus (i.e., debris), which microbes decompose and detritivores (e.g., a diverse group of other fish and macroinvertebrates) consume. Secondary consumers then prey on the primary consumers. The secondary consumers consist mainly of a variety of invertebrates (e.g., polychaete worms, snails, crayfish, and other macroinvertebrates) and fish. The top consumers (i.e., fish such as rainbow trout and brown trout) then prey on the secondary consumers. The role of a species in the food web may be different at different life stages, or it may use various levels of the food web simultaneously.

AQUATIC MACROINVERTEBRATES

Aquatic macroinvertebrates form a complex web toward the base of the food chain in mid- to high-elevation streams in the Sierra Nevada. Diversity and richness of aquatic macroinvertebrates are positively correlated with stream health and ecological function. It is likely that a diverse group of species can be found in all waters of the wildlife areas. Functional feeding groups among aquatic macroinvertebrates can be broken up into shredders, grazers, collector-gatherers, and predators. Organisms in these feeding groups shred coarse organic matter such as leaf litter that cannot otherwise be directly consumed, graze algae off rocks, gather plankton and other floating organic material, and prey on larval fish and other invertebrates. In general, shredders and collectors are more common in upstream reaches, whereas grazers are more common downstream in the lower reaches. The river continuum concept (Vannote et al.1980) describes how the nature of streams and their biotic communities evolve in a continuous gradient from headwaters to the ocean. In general, the farthest upstream reaches of mountain streams have a closed riparian canopy with little light penetration, while downstream reaches are broader with photosynthesis occurring to a much greater extent within the stream. Therefore, in the headwater streams, shredders are key in making plant material that enters the stream from the terrestrial environment available to the aquatic environment. Similarly, upstream reaches are likely more pristine and capable of supporting sensitive taxa such as mayflies, stoneflies, and caddiflies. These insect orders are known scientifically as ephermeroptera, plecoptera, and trichoptera (commonly referred to as EPT taxa); and collectively their presence or absence gives a measure of EPT taxa richness. A measure of the EPT richness indicates the stream health and the degree to which it has degraded. EPT taxa largely depend on clean, highly oxygenated water for survival and are therefore generally found in riffles of relatively pristine streams.

Macroinvertebrates may spend their entire lives in the aquatic environment or may demonstrate an adult terrestrial life phase. This is common in species of the EPT taxa, where they live a variable amount of time as juveniles or "nymphs" in the stream benthos (i.e., the bottom of a body of water) before emerging in a winged phase into the terrestrial environment as adults. Additionally, aquatic macroinvertebrates go through either an incomplete or a complete metamorphosis in their juvenile phase. Incomplete being that they metamorphose from "nymphs" directly into adults. The complete metamorphosis involves a pupation phase in between larval and adult phases where pupae enter a casing or enclosure where they are unable to eat or move. After a variable pupation period, the insect emerges from its casing (cocoon), emerges, and flies away as an adult. The adults remain associated with the aquatic environment and return to deposit their eggs (oviposit) on the water surface, thus beginning the cycle again.

FISH COMMUNITIES

The fish communities living in streams within the wildlife areas are similar to those commonly associated with mid- to high-elevation Sierra Nevada streams. Creeks within the wildlife areas provide aquatic habitat for at least eight species of fish, including native and nonnative species (Table 3.3-5). The creeks located in the wildlife areas drain from the higher elevation mountains into the Sierra Valley and are generally characterized as coldwater, moderate-gradient streams. The species assemblage associated with these streams has historically been the rainbow trout assemblage. This assemblage is made up of rainbow trout, sculpin (*Cottus gulosus*), speckled dace (*Rhynichthys osculus*), and mountain sucker (*Catostomus platyrhynchus*) and is dependent on coldwater mountain stream habitat and a rich macroinvertebrate community (described above). However, the introduction of the brown trout has likely changed the species composition of these streams. Whereas rainbow trout were naturally the top predator in the aquatic ecosystem, brown trout are able to outcompete them for forage, habitat, and may even prey directly on them. While rainbow trout feed almost exclusively on invertebrates, brown trout are known to consume other fishes as a component of their diet, which often includes young rainbow trout. Overall, rainbow trout and brown trout occupy a similar habitat niche in the streams of the wildlife areas and exhibit similar life history strategies.

Table 3.3-5 Fish Species Known or with Potential to Occur in Antelope Valley and Smithneck Creek Wildlife Areas	
Common Name	Scientific Name
Rainbow trout (N)	*Orcorhynchus mykiss*
Lahontan cutthroat trout (N)*	*Oncorhynchus clarki henshawi*
Mountain sucker (N)	*Catostomus platyrhynchus*
Riffle sculpin (N)	*Cottus gulosus*
Speckled dace (N)	*Rhynichthys osculus*
Brown trout (I)	*Salmon trutta*
Brook trout (I)	*Salvelinus fontinalis*
Golden shiner (I)	*Notemigonus crysoleucas*

Source: Department unpublished data
N=Native, I=Introduced
* The Lahontan cutthroat trout is native to the Lahontan region in California, which does not include the Antelope Valley or Smithneck Creek Wildlife Areas.

AQUATIC HABITATS

Important components of aquatic habitat in the streams flowing through the wildlife areas include flow-related habitat types (e.g., pools, riffles, and runs formed through geomorphic processes), instream cover (e.g., boulders and LWD), and riparian elements (e.g., vegetation and instream tree and shrub debris). All of these habitat components provide structure and complexity that benefit the diversity and abundance of aquatic species.

The majority of aquatic macroinvertebrates are concentrated in riffle habitats where dissolved oxygen is high and relatively coarse substrates (e.g., gravel, cobble) are present. Trout and other fish species use all habitat types at some point during their life cycle. Trout spawning is generally associated with riffle and run habitats where adequate gravel substrate and water flow are available for spawning. Juvenile trout use edge habitats where stream velocities are low and structure is present to support prey and provide refuge. Aquatic vegetation and riparian cover along with instream LWD serve as important juvenile fish habitats.

In the wildlife areas, riffle habitats are generally dominant and pool habitat is lacking. The streams in the wildlife areas are largely bordered by pine forests in their higher reaches and mountain meadow in their mid to lower reaches. Stream flows vary; high flood flows from spring runoff typically peak in May. Extensive habitat degradation, including channel incision and bank erosion, has occurred in most of the creeks. These effects are largely caused by excessive grazing, road construction, logging, and wildfires (Appendix D). Since the 1950s ecologists have recommended temporary removal of cattle from the stream channels and adjacent lands as a measure to reduce erosion and channel incision.

In spite of the degradation of these creek systems, these creeks have been valued for their abundant populations of rainbow and brown trout. While recent wildfires may have decreased trout populations, Smithneck, Badenaugh, and Bear Valley Creeks have all been praised for their high densities of trout, which provide excellent recreational opportunities. A brief discussion on each of the creeks flowing through the wildlife areas is provided below.

Antelope Valley Creek

Antelope Valley Creek is a small perennial stream that originates in the mountains south of the town of Loyalton and flows along Antelope Valley Road into the Antelope Valley. The creek is dammed just outside of the wildlife

area boundary, forming Palen Reservoir, which regulates the flow of Antelope Creek north into Antelope Valley and eventually into Sierra Valley and the Middle Feather River. The creek originates at about 6,500 feet elevation and drops roughly 1,600 feet before entering the Antelope Valley at about 4,900 feet. Antelope Valley Road parallels Antelope Valley Creek from the lower Antelope Valley up the drainage and down an unnamed stream to Bear Valley Creek and the Sierra Brooks subdivision. In addition to Antelope Valley Road, a network of smaller roads was built in the early 1900s in conjunction with the lumber mill and logging operations in the central part of the watershed. These roads have altered the hydrology of the watershed by intercepting overland flow, concentrating tributary flow, and thus dewatering natural channels, increasing erosion potential, and causing incision of the creek channel. Construction of Palen Reservoir disrupted natural drainage patterns through excavation of floodplain areas for dam construction and the engineering of channels around and below the reservoir to convey flows. A damaged diversion structure above Palen Reservoir still partially diverts flows into a canal that bypasses the reservoir. The current state of Antelope Valley Creek is a channel that has become incised up to 8 to 10 feet in some areas. As a result of the channel incision, the stream flow has become entirely isolated from its floodplain in the meadow.

In the summer of 1988, the Department stocked Palen Reservoir with fingerling Lahontan cutthroat trout (*Oncorhynchus clarki henshawi*) with the objective that the species would naturalize in the small lake. In subsequent years, young of the year Lahontan cutthroat trout were observed in Palen Reservoir, confirming natural reproduction in the system, however, spawning sites were unknown. Since the initial introduction, the reservoir has been stocked on three other occasions. Lahontan cutthroat trout were observed and captured in the lower Antelope Valley Creek on DFG property; however, only two individual fish were sampled and conditions in Palen Reservoir and lower Antelope Valley Creek during the late summer and fall of dry years appear to prohibit the survival of Lahontan cutthroat trout (Hiscox 2000).

Badenaugh Creek

Badenaugh Creek flows northwest out of the high elevation areas of the Sierra Nevada and into Smithneck Creek just upstream of the Sierra Brooks subdivision south of Loyalton. It originates as a first order stream at about 7,200 feet and drops about 1,800 feet before entering Smithneck Creek from the east side. By the time it flows into Smithneck Creek at 5,400 feet it becomes a second order stream. Badenaugh Creek consists of a high gradient, step-pool system bordered by riparian and upland forest. The creek has been degraded partially by construction of an old railroad grade and the road system that follows the creek through Badenaugh Valley. The alignment of the railroad grade causes the diversion of spring-fed tributaries from their natural channels, causing a concentration of flows and subsequent erosion of channels. The road currently moves through the riparian zone along the stream causing rutting and erosion in the downstream meadow. The Department stocking records indicate that the creek was stocked with rainbow trout, brook trout, and brown trout through the 1950s.

Bear Valley Creek

Bear Valley Creek flows north out of Bear Valley and into Smithneck Creek from the west just downstream of the Sierra Brooks subdivision. The stream originates at 6,800 feet elevation and drops to 5,100 feet by the time it enters Smithneck Creek. The creek is adjoined by a healthy riparian corridor. In the lowest 1.5 miles of the creek above the junction with Smithneck Creek, Bear Valley Creek flows through the Bear Valley Meadow. The meadow is presently degraded with severely incised (i.e., entrenched) stream channels, which are actively eroding the banks and contributing sediments downstream to Smithneck Creek near the town of Loyalton. Dating back to the 1930s rainbow and brook trout have been stocked periodically in Bear Valley Creek.

Smithneck Creek

Smithneck Creek is the largest creek in SCWA, draining an area of approximately 31.6 square miles including the Bear Valley Creek and Badenaugh Creek drainages. It flows out of a high altitude basin in the Sierra Nevada just north of Stampede Reservoir. Originating at about 7,200 feet, it flows north-northeast 13 miles to the town of

Loyalton and finally into the Sierra Valley and the Middle Fork of the Feather River. Smithneck Creek is thought to provide some of the highest quality angling for brown trout anywhere in California, with the upper reach (above Badenaugh Creek) supporting the highest densities of fish. Baseline flows in Smithneck Creek average about 5–8 cubic feet per second (cfs) with flood flows reaching as high as 85 cfs. The lowest third of the creek is known to support mountain suckers.

SPECIAL-STATUS FISH SPECIES

Special-status fish species are legally protected or are otherwise considered sensitive by federal, state, or local resource conservation agencies and organizations. No special-status fish species are known to occur in aquatic habitats within the wildlife areas. As discussed above, Lahontan cutthroat trout (listed as federally threatened) were unsuccessfully introduced to Palen Reservoir, which is located on Antelope Valley Creek outside of the boundary of the wildlife areas.

3.3.5 REGULATORY SETTING

FEDERAL PLANS, POLICIES, REGULATIONS, AND LAWS

Federal Endangered Species Act

The U.S. Fish and Wildlife Service (USFWS) has authority over projects that may affect the continued existence of a federally listed (threatened or endangered) plant or wildlife species. Section 9 of Endangered Species Act (ESA) prohibits the take of federally listed species; take is defined under ESA, in part, as killing, harming, or harassment. Under federal regulations, take is further defined to include habitat modification or degradation where it results in death or injury to wildlife by significantly impairing essential behavioral patterns, including breeding, feeding, or sheltering. The Cooperative Agreement between the USFWS and the Department allows Department staff certain types of take of federally listed species under specific circumstances; see http://www.dfg.ca.gov/wildlife/species/publications/docs/CDFGCooperativeAgreementWithUSFWS.pdf .

Clean Water Act

Pursuant to Section 404 of the Clean Water Act, the U.S. Army Corps of Engineers (USACE) regulates discharge of dredge or fill material into waters of the United States. Waters of the United States and their lateral limits are defined in Section 33 of the Code of Federal Regulations Part 328.3 (a) and include navigable waters of the United States, interstate waters, all other waters where the use or degradation or destruction of the waters could affect interstate or foreign commerce, tributaries to any of these waters, and wetlands that meet any of these criteria or that are adjacent to any of these waters or their tributaries. Fill is defined as any material that replaces any portion of a waters of the United States with dry land or changes the bottom elevation of any portion of a waters of the United States. Any activity resulting in the placement of dredge or fill material to waters of the United States requires a permit from USACE.

Migratory Bird Treaty Act

The federal Migratory Bird Treaty Act (MBTA), first enacted in 1918, implements domestically a series of treaties between the United States and Great Britain (on behalf of Canada), Mexico, Japan, and the former U.S.S.R., which provide for international migratory bird protection, and authorizes the U.S. Secretary of the Interior to regulate the taking of migratory birds. The MBTA provides that it shall be unlawful, except as permitted by regulations, "to pursue, take, or kill any migratory bird, or any part, nest or egg of any such bird" (16 United States Code 703). The current list of species protected by MBTA can be found in the August 24, 2006 Federal Register (71 FR 50194). The list includes nearly all birds native to the United States. Nonnative species such as house sparrows and European starlings are not protected by this statute, nor are native, nonmigratory

upland game birds such as quail. Section 3513 of the California Fish and Game Code provides for adoption of the MBTA's provisions at the state level.

U.S. Forest Service Sierra Nevada Forest Plan Amendment

The management direction of the Sierra Nevada Forest Plan Amendment lists management goals and strategies for aquatic, riparian, and meadow ecosystems and associated species. The goals provide a comprehensive framework for establishing desired conditions at larger scales, including river basin, watershed, and landscape scales. Moving ecosystem conditions toward these goals will restore and maintain the physical, chemical, and biological integrity of the region's waters as mandated by the Clean Water Act, and will support the U.S. Forest Service's mission to provide habitat for riparian and aquatic-dependent species under the National Forest Management Act, Organic Act, Safe Drinking Water Act, Endangered Species Act, and Electric Consumers Protection Act. Goals and objectives are provided to maintain and restore the characteristics of watersheds and aquatic habitats.

STATE PLANS, POLICIES, REGULATIONS, AND LAWS

Native Plant Protection Act

Sections 1900–1913 of the California Fish and Game Code codify the Native Plant Protection Act, which is intended to preserve, protect, and enhance endangered or rare native plants in the state. The act directs the Department to establish criteria for determining which native plants are rare or endangered. Under Section 1901, a species is endangered when its prospects for survival and reproduction are in immediate jeopardy from one or more cause. A species is rare when, although not threatened with immediate extinction, it is in such small numbers throughout its range that it may become endangered if its present environment worsens. Under the act, the Fish and Game Commission may adopt regulations governing the taking, possessing, propagation, or sale of any endangered or rare native plant.

California Endangered Species Act

Pursuant to the California Endangered Species Act (CESA) and Section 2081 of the California Fish and Game Code, a permit from the Department is required for projects that could result in the take of a state-listed threatened or endangered species. Under CESA, the definition of "take" is understood to apply to an activity that would directly or indirectly kill an individual of a species, but the definition does not include "harm" or "harass," as the federal act does.

California Environmental Quality Act

The California Environmental Quality Act (CEQA; California Public Resources Code § 21000-21177) requires State agencies, local governments, and special districts to evaluate and disclose impacts from "projects" in the State. Section 15380 of the CEQA Guidelines clearly indicates that species of special concern may be included in the CEQA definition of rare, threatened, or endangered species, if they can be shown to meet the criteria of outlined in that section of the Public Resources Code. .

Sections 15063 and 15065 of the CEQA Guidelines, which address how an impact is identified as significant, are particularly relevant to Species of Special Concern. Project-level impacts to listed (rare, threatened, or endangered) species are generally considered significant thus requiring lead agencies to prepare an Environmental Impact Report to fully analyze and evaluate the impacts. In assigning "impact significance" to populations of non-listed species, analysts usually consider factors such as population-level effects, proportion of the species' or sub-species' range affected by a project, regional effects, and impacts to habitat features.

California Fish and Game Code Section 1602—Streambed Alteration

All diversions, obstructions, or changes to the natural flow or bed, channel, or bank of any river, stream or lake in California that supports wildlife resources are subject to regulation by the Department, pursuant to Section 1602 of the California Fish and Game Code. Section 1602 states that it is unlawful for any person, governmental agency, state, local, or any public utility to substantially divert or obstruct the natural flow or substantially change the bed, channel, or bank of any river, stream, or lake, or deposit or dispose of debris, waste, or other material containing crumbled, flaked, or ground pavement where it may pass into any river, stream, or lake without first notifying the Department of such activity. The regulatory definition of stream is a body of water that flows at least periodically or intermittently through a bed or channel having banks and supports wildlife, fish or other aquatic life. This includes watercourses having a surface or subsurface flow that supports or have supported riparian vegetation. The Department's jurisdiction within altered or artificial waterways is based on the value of those waterways to fish and wildlife.

California Fish and Game Code Section 3503 and 3513—Protection of Birds

Section 3503 of the California Fish and Game Code states that it is unlawful to take, possess, or needlessly destroy the nest or eggs of any bird. Additional regulations protect individual birds in addition to their nests and eggs. Under Section 3503.5 it is unlawful to take, possess, or destroy species in the orders Falconiformes or Strigiformes (birds of prey or raptors). Section 3513 states that it is unlawful to take or possess any migratory nongame bird as designated in the Migratory Bird Treaty Act. Typical violations include destruction of active raptor nests because of tree removal, and failure of nesting attempts (i.e. loss of eggs or young) attributable to disturbance of nesting pairs by nearby human activity.

California Department of Fish and Game Code, Section 1700—Conservation of Aquatic Resources

Section 1700 of the Department Code states the importance of the maintenance of sufficient populations of all species of aquatic organisms to insure their continued existence.

California Department of Fish and Game Code, Section 2600–2602

Section 2600–2602 of the Department Code stresses the importance of habitat for the continued existence of healthy, vigorous populations of fish and wildlife. This section of the code provides the financial means to correct the most severe deficiencies in fish and wildlife habitat in California through acquisition, enhancement, and development of habitat areas that are most in need of proper conservation and management.

California Department of Fish and Game Code, Section 2761

The Department Code acknowledges that fish and wildlife are important public resources with significant economical, environmental, recreational, aesthetic, and educational values and that they have declined as a result of development. California should make reasonable efforts to prevent further decline and protect fish and wildlife resources such as salmon and trout.

Loyalton-Truckee Deer Herd Management Plan

The Loyalton-Truckee Deer Herd Management Plan provides guidelines and objectives for long-term management of the Loyalton-Truckee deer herd. The goals of the plan are consistent with the general goals set forth in "A Plan for California Deer" in 1976 (Department 1976). These state-wide goals are to restore and maintain healthy deer herds in the wild in California, and to provide high quality and diversified use of deer.

3.4 CULTURAL RESOURCES

Human occupation in the Sierra Nevada Mountain Range (Sierra Nevada) dates to thousands of years ago; important habitation and activity sites are found in many areas where landforms and resources important to early Native American populations could be found. To some extent, human intervention has shaped the present-day landscape and the natural resources found at AVWA and SCWA. From the introduction of invasive plant species to the large-scale cutting of timber, introduction of cattle ranching in the19th and early 20th centuries, and impoundment of streams and rivers, what may at first appear to be a pristine natural setting has in fact been heavily influenced by people's manipulation and uses of the land. A brief review of the sequence of Native American and Euro-American occupation and their effects on the landscape is presented below.

3.4.1 PREHISTORIC ARCHAEOLOGICAL SETTING

In general, the prehistory of AVWA and SCWA and the surrounding area has not been extensively investigated and the sequence of cultural manifestations is not well understood. However, sites and artifacts that have been documented in AVWA and SCWA appear to relate to the cultural chronologies based on sites found primarily in the nearby Tahoe Basin. Heizer and Elsasser (1953) were the first researchers to postulate an archaeological chronology for the north-central Sierra Nevada. The mutually exclusive site locations and tool technologies noted from the Tahoe Basin and the surrounding region reveal two main cultural manifestations or "complexes":

- **The Martis Complex (ca. 5000–1300 Before Present [B.P.])**. This period is also commonly referred to as the Middle Archaic and was defined by a heavy reliance on flaked basalt implements and milling stones and slabs for the grinding of seed foods. The predominance of flaked and ground stone artifacts on archaeological sites of this time appears to reflect an economic focus on hunting and seed gathering. This complex was first identified at site CA-Pla-5 in Martis Valley, south of Truckee.

- **The King's Beach Complex (ca. 1300–150 B.P.)**. In contrast with the Martis Complex, technology during this time was characterized by chert and obsidian toolstone, bedrock mortars, smaller projectile points (presumably arrow points), and an economic emphasis on fishing and seed gathering. The King's Beach Complex is usually attributed to the late prehistoric Washoe. Archaeological site CA-Pla-9 on the north shore of Lake Tahoe is typical of the Kings Beach Complex.

Heizer and Elsasser's 1953 archaeological sequence for the north-central Sierra was revised and expanded to reflect research findings by Elston (1970, 1972), Elston and Davis (1972), and Elston et al.(1976). Based on later discoveries of stratified archaeological deposits, the presence of stemmed-series projectile points from the Great Basin, and accompanying radiocarbon dates, the regional chronological framework was amended to include a pre-Martis culture and defined a transitional phase between Martis and Kings Beach (Elston et al. 1976). Elston's "Pre-Archaic" (pre-Martis) incorporates the ill-defined **Tahoe Reach Phase** and broadly places the earliest Eastern Front prehistory between 10,000 and 8000 B.P. It is generally equated with small, highly mobile groups whose economy was focused on game hunting. Little evidence for sites of this phase has been found in the Sierra Nevada. Its presence in the region is postulated based on sites of this age at lower elevations. Better-defined cultural manifestations defined by Elston (1970, 1972), and Elston et al. (1976) include:

The Early Archaic (8000–5000 B.P.). Consisting of the Spooner Phase, the Early Archaic is described by Elston et al. (1976) as "a hypothetical construct to name the interval for which little archaeological data existed, and it remains poorly known to the present." This cultural phase has been characterized (but not without some controversy; see Milliken and Hildebrandt 1997) by the presence of projectile points of the Pinto (Gatecliff) Split Stem series and Humboldt series found predominantly in the Great Basin. Paleoenvironmental conditions during this period reflect a widespread Middle Holocene warming and drying trend. General cultural patterns attributed to the Early Archaic include small game hunting, increased milling of hard seeds, and a mixed-mode, forager-collector subsistence strategy.

The Middle Archaic (5000–1300 B.P.). As defined by Elston et al. (1976), this period is represented by the Early Martis (5000–3000 B.P.) and the Late Martis (3000–1300 B.P.) phases. During this time, conditions became cooler and wetter, similar to the climate experienced today. Human populations increased and diversified, though remained small enough to prevent resource overexploitation (Zeier and Elston 1992). The origins and cultural implications of the Martis Complex remain a mystery to local researchers and debate continues (e.g., Bloomer et al. 1997; Clewlow 1984; Duke 1998; Elsasser and Gortner 1991; Jackson et al. 1995). Current research and discussion focuses on whether the Martis Complex represents a distinct cultural phenomenon or a unique technological system specializing in Sierra Nevada resources, particularly the uncharacteristic reliance on basalt toolstone. Lindström (1985), for instance, speculates that Martis reflects an indigenous Sierran culture rather than representing groups from Great Basin or California, thus incorporating the mountain setting into their seasonal settlement and subsistence patterns.

The Late Archaic is divided into the **Early Kings Beach Phase (1300–700 B.P.)** and **Late Kings Beach Phase (700–150 B.P.)** (Elston et al.1994). The transition from Middle to Late Archaic/ethnographic Washoe is described as one of "profound cultural change" (Elston 1986:19). Environmental conditions continued to be temperate during the Late Archaic, although periodic warm-dry intervals appear to have resulted in substantial and prolonged droughts (Lindström and Bloomer 1994). Socio-economic and technological changes likely resulted from population increases and "demographic packing" and consequent "interspersed" settlement patterns (Elston 1986). Innovations attributed to the Late Archaic include the bow and arrow, the increased use of bedrock mortars for piñon pine exploitation, and an increase in the use of simple flake tools. The inclination toward basalt and other coarse-grained material for tool manufacture decreased during this time, while obsidian and chert were increasingly exploited.

In summary, the current cultural chronology for the Sierra/Lake Tahoe region recognizes six generally distinct phases, each of which can be defined in large part by the presence of distinct projectile points found on archaeological sites:

- Tahoe Reach Phase (ca. 10,000–8000 B.P.)—Great Basin Stemmed series projectile points.
- Spooner Phase (ca. 8000–5000 B.P.)—various large basalt projectile points.
- Early Martis Period (ca. 5000–3000 B.P.)—Martis Contracting Stem and Martis Split Stem projectile points.
- Late Martis (ca. 3000–1300 B.P.)—Martis Corner Notched, Elko Corner Notched, and Elko Eared points.
- Late Archaic is divided into:
  - Early Kings Beach Phase (ca.1300–800 B.P.)—Rosegate and Gunther Series points.
  - Late Kings Beach Phase (ca. 800–150 B.P.)— Desert Side-Notched and Cottonwood series projectile points.

3.4.2 ETHNOGRAPHIC SETTING

Within and near AVWA and SCWA, accounts differ as to the exact boundaries of Native American tribal groups that have identified the area as their traditional territory. Although cultural and tribal boundaries tended to shift over time or be poorly defined, research indicates that the region was essentially a border area between the Washoe, centered around Lake Tahoe, and the Maidu to the west. Both of these tribes may have used the landscape within AVWA and SCWA and exploited its natural resources during prehistoric times and into the ethnographic and historic eras.

The Washoe-Maidu boundary near AVWA and SCWA differ somewhat between maps published by Kroeber (1925) and d'Azevedo (1986). Still different divisions of Washoe and Maidu territories can be found in Riddell (1978). It is important to note that these conflicting boundaries were drawn as the result of ethnographic observations, historical accounts, and oral interviews. Information could vary from region to region, between tribes, and likely even between members of the same tribe. In addition, boundaries were often flexible and, in the end, were not necessarily delineated according to landscape features, oral tradition, or resource area. Regardless, despite cultural differences, these tribes appear to have inhabited and used the landscape in similar ways. This was

particularly the case when resources were abundant, or where trade and travel routes or mountain passes were present and joint use was typically accommodated through negotiation (d'Azevedo 1986:467).

WASHOE

Although the Tahoe Basin to the south of AVWA and SCWA is considered the spiritual and geographic center of the Washoe world (Downs 1966:16), at the time of Euro-American contact, Washoe settlements were found in the larger valleys on and along the eastern slope of the Sierra Nevada between Honey Lake to the north and Little Antelope Valley to the south (d'Azevedo 1986:468; Carlson 1986; Elston 1986:13; Price 1962, 1980). They are members of the widespread Hokan linguistic group and the only Great Basin group to speak a non-Numic language. Although the evidence is far from conclusive, Kroeber (1925:569) and Downs (1966:70) postulate an early relationship prior to 4,500 years ago between the Hokan speaking Washoe and other Hokan speakers in California.

The traditional Washoe were organized into basic household or extended family units residing in multifamily communities (Barrett, S.A. 1917:8; Jackson et al. 1994). Groups maintained ties with each other as well as with neighboring Penutian-speaking Maidu and Miwok to the north, south, and west, and with the Paiute to the east in the Great Basin. The Washoe had one of the highest precontact population densities in the region (Lindström and Bloomer 1994:27; Price 1980) and pursued an "intensive subsistence strategy and a demographically packed settlement pattern" as defined by Zeier and Elston (1986:379). This land use pattern involved high seasonal mobility, mixed strategies of foraging and collecting, and the intensive exploitation of various perennial and seasonal floral and faunal resources.

Fishing was one of the most important forms of subsistence acquisition available to the Washoe in lake, stream, and river settings and d'Azevedo (1986:473) and Lindström (1992:308) suggest that this activity provided the most predictable and consistent source of year-round food during prehistoric and ethnographic times. The hunting of large and small mammals provided hides, bones, ligaments, and other important materials but also constituted another important food source. The late summer and early fall were preferred hunting seasons when species such as mule deer, pronghorn antelope, and mountain sheep were at their most robust. Hares and jackrabbits (white-tailed jackrabbit, cottontail and snowshoe hare) also supplied an abundant meat source and drives were organized in late fall to take advantage of this important resource.

The wide variety of flora available within Washoe territory provided a substantial part of their diet and many species were valued for their medicinal properties. The varied distribution of seasonally available plants was a major factor in the dispersal of Washoe groups and their frequent movements over a large range. Two of the most important Washoe staple foods, pine nuts (*ta gim*) and acorns (*malin*) for example, were available mostly in the late fall and winter when other plant resources were becoming scarce.

In general, Washoe lifeways remained largely unchanged for centuries until the middle decades of the 19th century. Would-be miners, loggers, ranchers, and Euro-American settlers began to flood the region following the gold strikes in the Sierra Nevada foothills and the silver discoveries in the nearby Nevada Comstock Lode. The Washoe, like many Native American groups in California and Nevada, suffered greatly from the loss of their traditional territory and lifeways and their population decreased dramatically and soon became marginalized. Today, however, the Washoe people constitute a thriving native community and they are reinvesting in their heritage and culture through new-found political, economic, and social influence throughout the Sierra Nevada region.

NORTHEASTERN MAIDU

The Northeastern or "Mountain" Maidu traditionally inhabited a region including the drainages of the American and Feather rivers in the northern Sierra Nevada (Riddell 1978). Accounts indicate that because of the deep snows and marshy conditions found in nearby Sierra Valley for most of the year, the Maidu spent little time there;

however, no information specific to the Antelope Valley is known to exist. It can be assumed that the Maidu in the northernmost areas of their territory had contact with the Pit River tribes (Kroeber 1925) and they certainly would have had some kind of relationship with the Washoe peoples to the south.

The Maidu, unlike their Washoe neighbors, spoke a series of dialects of the Maiduan family of languages, classified as California Penutian (Riddell 1978:370). In general, Maiduan speakers inhabited areas above 4,000 feet, such as the Sierra and Mohawk valleys. Village sites were only seasonal and were in use during the warmer months, thereby limiting to a certain degree their contact with the Washoe. Maidu settlement patterns used a "village community" system as described by Kroeber 1925:398), which served as the only formal political organization of the tribe. Each community, consisting of several villages, was politically autonomous and included an often larger central village where an earth-covered lodge and dance-house were built. This central village served as the political hub of the community and often served as the residence for the head-man who served primarily as an advisor and spokesman for the community members, although he did not necessarily wield strict political power (Dixon 1905:224).

Village community territories in the Maidu's mountainous environment were typically well defined by the valleys in which they were established (Kroeber 1925:398). In the larger glacial valleys (such as the Sierra and Antelope valleys), the floors were often covered with snow during the winter months but became marshy drainages during the warmer seasons. The Maidu took advantage of these resource-rich valley bottoms and, according to Dixon (1905:175), "selected sites along the edges of these valleys and rarely lived out in the middle of the level stretches." Archaeological evidence also demonstrates the tendency of the Maidu to live in those settings that provided easy access to subsistence resources and good views of the surrounding landscape (McMillin 1963:63); Riddell and Pritchard 1971).

As with their Washoe neighbors, hunting and fishing, particularly in the higher elevations of the Maidu territory, were important subsistence activities. Fish species inhabiting the rivers and creeks within individual village community territories were caught with small baglike nets or seine nets stretched across a stream channel (Dixon 1905:143). Game such as grizzly bear, deer, elk, and various birds were hunted individually or en masse using drives and traps. Although pursued chiefly as food sources, game animals also provided a valuable source for raw materials such as hides, tendons, and bones, which were used for clothing and the numerous implements necessary for daily life.

Although the Washoe were one of the last tribes in the region to be affected by incursions of Euro-Americans, the Maidu came into regular contact with Spanish explorers and American trappers during the early decades of the 19th century. In 1808, Gabriel Moraga first encountered the Maidu on his expeditions up the lower reaches of the Feather River and, by the 1830s, Hudson's Bay Company trappers were regularly traveling through Maidu territory. However, it wasn't until the discovery of gold at Coloma in 1848 that sustained and often disastrous contacts became the norm. Although the patterns of Euro-American impact on Maidu culture mirror those of other California tribes, the Maidu have a renewed interest in their traditional culture and values. The Maidu, like the Washoe, represent a growing and proud native California community.

3.4.3 HISTORIC-ERA SETTING

Although contact between Native American tribes and Euro-Americans had begun decades earlier, a party of would-be miners first entered the Sierra Valley (adjacent to and to the northwest of Antelope Valley) in the summer of 1850 and essentially ushered in an era of sustained nonnative control of the region (Sinnot 1982). However, trapper and adventurer James P. Beckwourth is most often credited with the "discovery" of the Sierra Valley in 1851 where he settled the following year:

> In the spring of 1852 I established myself in Beckwourth Valley (present-day Sierra Valley), and finally found myself transformed into a hotel-keeper and chief of a trading post. My house is considered the emigrant's landing-place, as it is the first ranch he arrives at in the golden state, and is the only house between this point and Salt Lake. Here is a valley two hundred and forty miles in circumference,

> containing some of the choicest land in the world. Its yield of hay is incalculable; the red and white clovers spring up spontaneously, and the grass that covers its smooth surface is of the most nutritious nature. When the weary, toil-worn emigrant reaches this valley, he feels himself secure; he can lay himself down and taste refreshing repose, undisturbed by the fear of Indians….

By the late 1850s numerous trails and wagon roads were established to handle the transport of goods and people from Sierra Valley, and the towns of Beckwourth, Loyalton, and Sierraville to the Nevada Territory and back. The town of Beckwourth in the northern part of the valley was founded in 1852 and the southern town of Smith's Neck was founded in 1854. By 1863, with the Civil War raging in the eastern states, the Unionist sentiments of the Smith's Neck residents led to the renaming of the town to Loyalton (Kirkham 1976). The northern part of the valley was settled primarily by farmers and ranchers and was less populated than the southern portion of the valley and the surrounding area (SVRCD 2005). The southern portion of the valley was more heavily wooded and communities such as Sierraville and Loyalton served as ranching and lumber towns that developed in support of the Comstock Lode mines (named after one of the discoverers of the silver deposits) in Nevada.

Although the Gold Rush of the late 1840s and the early and mid-1850s often brought would-be miners to California from all corners of the globe, most of the immigrants that settled in the Sierraville and Loyalton area were born in the United States. The backgrounds of several area pioneers are typical of those that settled near AVWA and SCWA (Fariss & Smith 1882):

> Walter Banet—Born in Mississippi in 1855, he graduated from the Missouri Medical College and in 1881 was stationed in Nevada as a surgeon with the U.S. Indian Service. By 1882 he had settled in Loyalton and established a thriving medical practice.
>
> Thomas F. West—Born in 1820 in Rensselaer County, New York, he worked as a farmer and small merchant in New York and Wisconsin before coming to California in 1871. By 1882 he had settled on a farm about 2 miles northeast of Loyalton.
>
> Michael Hardin—Born in 1819 in Bergen, New Jersey, he came to California in 1851 and worked as a miner in Placer and Yuba Counties. In 1857 he purchased a 240 acre ranch 1.5 miles north of Sierraville.
>
> E.H. Hamlen—Born in Maine in 1836, he arrived in San Francisco in 1857 and worked as a miner and logger in Alleghany (Sierra County) until 1859 before settling on a 540-acre farm and ranch in the Sierra Valley.

Sierra County split from Yuba County in 1852 and had a population of 11,400 by 1860. Euro-American settlers of Sierra Valley such as those mentioned above were most highly concentrated along the rim of the valley and in the forested areas. The predominant economic industries of the valley included dairy and beef cattle, hay, and lumber. With the decline of the mining boom in California and in the Nevada Comstock Lode, the population of Sierra County by 1870 was only 5,600. The highest concentration of people in Sierra Valley fell into two areas: the communities along Highway 70 from Beckwourth to Chilcoot, and logging communities such as Sierraville in the southern portion of the Valley (SVRCD 2005).

Although beef, hay, and dairy products, such as butter, were produced in large quantities in Sierra Valley and the surrounding region, logging constituted the other major industry. Numerous lumber companies and their associated facilities were established near Sierraville and Loyalton during the latter decades of the 19th century. Lumber mills such as the Winnie Smith Mill in Antelope Valley, the California Mill on Smithneck Creek southeast of Loyalton, and the Lewis Mill, also on Smithneck Creek, processed the timber cut from local hillsides. Lumber companies, such as the Roberts Lumber Company (subsequently the Clover Valley Lumber Company and the Verdi Lumber Company), were major contributors to the local economy into the early decades of the 20th century. However, as commercially viable stands of timber were exhausted in the area, most of these companies went out of business or consolidated with other firms and shifted operations to more productive regions. Although logging continues near AVWA and SCWA today, it is generally localized and the industry no longer serves as one of the major economic mainstays of the region. Since the 1980s in particular two issues substantially reduced the amount of timber

harvested in the region. Helms and Tappeiner (1996) noted that conservation efforts to protect wildlife habitat resulted in a two-thirds reduction in the harvest of timber on public lands throughout California. Secondly, public opinion has led to efforts to restrict old-growth stands from commercial logging. Although few such stands are present near AVWA and SCWA, the general statewide pattern of restricted logging substantially reduced the timber industry in the region.

3.5 PUBLIC USE

Currently, hunting and fishing are the most common public recreational uses within AVWA and SCWA. Other recreation uses include wildlife observation and photography. The primary public use of the lands within AVWA and SCWA over the last century has been cattle and sheep grazing. Historically, small-scale logging operations were centered on a mill located near Antelope Creek. The remains of the lumber mill are now an archeological site. Mineral exploration occurred within AVWA under a special use permit in the 1990s, but no mineral production has occurred. Grazing is the only nonrecreational public use still occurring; cattle have grazed within AVWA in recent years under a memorandum of understanding with the Tahoe National Forest. No other commercial activities take place in the wildlife areas.

The following sections describe these current recreational and other public uses and the current regulations and management policies related to the uses.

3.5.1 RECREATION AT ANTELOPE VALLEY AND SMITHNECK CREEK WILDLIFE AREAS

Recreational activities at AVWA and SCWA are facilitated by the accessibility of the lands from paved state highways and paved and unpaved county roads. Despite this good access, AVWA and SCWA receive only moderate amounts of recreational use, which is focused primarily on hunting and fishing. Other activities include dispersed primitive camping and wildlife observation. Although not authorized on Department lands, off-highway vehicle (OHV) use occurs to varying degrees of intensity throughout the two areas.

HUNTING

The Department estimates that a few hundred hunters visit AVWA and SCWA each year, and deer hunting is one of the major uses of the units during the late summer and fall open seasons. The primary attraction for hunters is Rocky Mountain mule deer, which are the largest deer in the state, both in terms of body size and antlers. AVWA and SCWA are within Deer Zone X-7a, which includes most of eastern Sierra County, as well as portions of Plumas County and Lassen County to the north and Nevada County to the south. X zones are managed as premium hunting areas, with a preference-based drawing system used to distribute a limited number of deer tags each year (Department 2007a). (Additional details on deer tag quotas and deer hunting regulations applicable to AVWA and SCWA are provided below.) Deer tags for this and other X zones are highly coveted, with many more applications each year than available tags. A total of 315 tags were available for Zone X-7a for the 2007 season (Department 2007b).

While the total estimated number of deer taken by hunters within Zone X-7a during the past 5 years (2002–2006) has ranged from 75 to 139 deer (Department 2007c), kill location data derived from deer tag report cards submitted by hunters indicate a dozen or fewer deer were taken in or near AVWA and SCWA each of those years, with the exception of 2002, when about 17 were taken (Department 2007d).

Although deer hunting is the primary form of hunting at AVWA and SCWA, opportunities also exist for hunting small game, such as rabbits and tree squirrels and upland game birds, such as grouse, quail, and turkey. The area is not good bear habitat, although bear may pass through the area; therefore, only incidental bear hunting is likely to occur. In general, hunting for species other than deer is infrequent at AVWA and SCWA.

FISHING

Smithneck, Badenaugh, and Bear Valley Creeks have historically been stocked with rainbow, brook, and brown trout (see Section “3.3.4 Fish Communities”) and all have been noted for their high densities of trout, which provide excellent angling opportunities. Smithneck Creek is thought to provide some of the highest quality angling for brown trout anywhere in California, with the upper reach (above Badenaugh Creek) supporting the highest densities of fish. Although the level of angling activity on these creeks is not known, both creeks are

easily accessible on foot from the Sierra Brooks subdivision. Antelope Valley Creek within AVWA does not provide fishing opportunities. Informal observation by Department staff and patrol suggest that the level of activity is light.

OTHER RECREATION ACTIVITIES

Special regulations authorize camping at AVWA only from May 1 through October 31. Trailers are not allowed. Informal observations by Department staff indicate that camping use is very low, with most camping occurring during the deer hunting season. In the past, informal deer camps have been seen near access roads.

No designated trails exist within the wildlife areas; therefore, trail-oriented activities such as hiking, mountain biking, and horseback riding are uncommon. These uses may occur infrequently along Antelope Valley Road and Bear Valley Road and undesignated dirt roads branching off the county roads.

The variety of wildlife present within AVWA and SCWA, particularly in riparian areas, and the relatively easy access to these areas from county roads provide good opportunities for wildlife observation and photography. The Sierra Valley has been nationally recognized by the Audubon Society as an Important Bird Area (National Audubon Society 2004), and birders coming to the valley may also spend time in the wildlife areas, given their proximity to the valley and the opportunity for viewing species that are not present or as common in the open sagebrush and wetland habitats of the valley. In particular, visitors have good opportunities to observe raptors such as rough legged and ferruginous hawks, prairie falcons, and golden and bald eagles. The riparian areas provide opportunities to observe a variety of songbirds.

The Feather River Archery Club has in the past maintained a temporary archery range within SCWA. The club has expressed interest in developing a permanent archery range, open to the public and operated by the club. Such a facility would require a special use permit.

3.5.2 UNAUTHORIZED USES

California Code of Regulations, Section 550(b)(6)(A) precludes recreational OHV use on Department lands. However, illegal OHV use has regularly occurred on both AVWA and SCWA throughout their tenure as public lands. The California Vehicle Code prohibits OHV use on Antelope Valley Road and other public roads in the area but this prohibition is not well enforced. Substantial resources have been degraded by OHV near Bear Valley Creek and within adjacent wet meadows within SCWA, including soil compaction, erosion, and rutting. A primary source of this activity appears to be the adjacent Sierra Brooks subdivision. Some riders may be crossing Department lands on their way to authorized and unauthorized trails and other riding opportunities on adjacent Tahoe National Forest lands.

Other unauthorized uses that are sometimes observed on other wildlife areas and public lands in general, such as dumping of debris and trash and unauthorized camping or squatting, have not been observed to any visible degree.

3.5.3 OTHER ACTIVITIES

The current AVWA management plan (Department 1997) makes the area available for class trips, research, and other projects for local schools and other groups, with issuance of a permit by the Department's Region 2 manager.

The Smithneck Creek and Antelope Valley Creek watersheds have been the site of several data collection efforts and research projects in recent years, as the scientific and conservation community has focused interest and effort on learning about the effects of the recent large fires on the vegetation regime, fish and wildlife, and streams and has investigated ecological restoration options for the streams and the Sierra Valley. Although most of this activity has not taken place specifically within AVWA or SCWA, stream monitoring has taken place at various locations within the areas.

The SVRCD has worked with the Department and USFS on a long-term management plan for Antelope Valley, and has worked with the University of California Cooperative Extension to conduct water quality monitoring at Smithneck Creek, with a monitoring site near the Sierra Brooks subdivision, just outside the SCWA boundary (California Department of Conservation 2006). The Department has also engaged in ecological restoration actions since 1995 under the Smithneck Creek CRMP developed with the U.S. Department of Agriculture NRCS, the Tahoe National Forest, Sierra Brooks Homeowners Association, and other landowners and cooperators (University of California, Davis 2007).

3.5.4 POTENTIAL FOR FUTURE RECREATION DEVELOPMENT

Extensive recreational development within AVWA and SCWA would not be compatible with Department policies for wildlife areas, which state, "Except for hunting and fishing purposes, only minimum facilities to permit other forms of multiple recreational uses…shall be provided" (Fish and Game Code, Section 1528). However, the addition of regulatory and informational signage could facilitate resource protection as well as visitor enjoyment and appreciation of the areas. The 1997 AVWA management plan proposed coordinating with the Tahoe National Forest to add boundary markers and interpretive signage at the area entrance that describe Department ownership and explain management plans and objectives. The proposed restoration project on Antelope Valley Creek would present a new opportunity to develop interpretive information for visitors explaining the habitat enhancement methods and objectives of the project. Such information could be presented in kiosks located near travel routes in good wildlife viewing areas, with parking space provided for a few vehicles. Such kiosks could also present wildlife area maps and regulations.

3.5.5 PUBLIC USE REGULATIONS

The Department manages AVWA and SCWA under Title 14 of the California Code of Regulations, Sections 550 (General Public Use Activities) and 551 (Hunting, Firearms, and Archery Equipment Use and Permit Requirements), and the California Fish and Game Code, Sections 1525–1530 (the Regulations) (Department 2007). The Department strives to carry out management responsibilities related to public use as identified in the existing management plans and in keeping with the agency mission to manage the resources for the "use and enjoyment by the public." As state wildlife areas, wildlife and habitat protection and enhancement are the primary management purposes within AVWA and SCWA; recreation and public use are secondary to habitat preservation.

3.5.6 HUNTING REGULATIONS

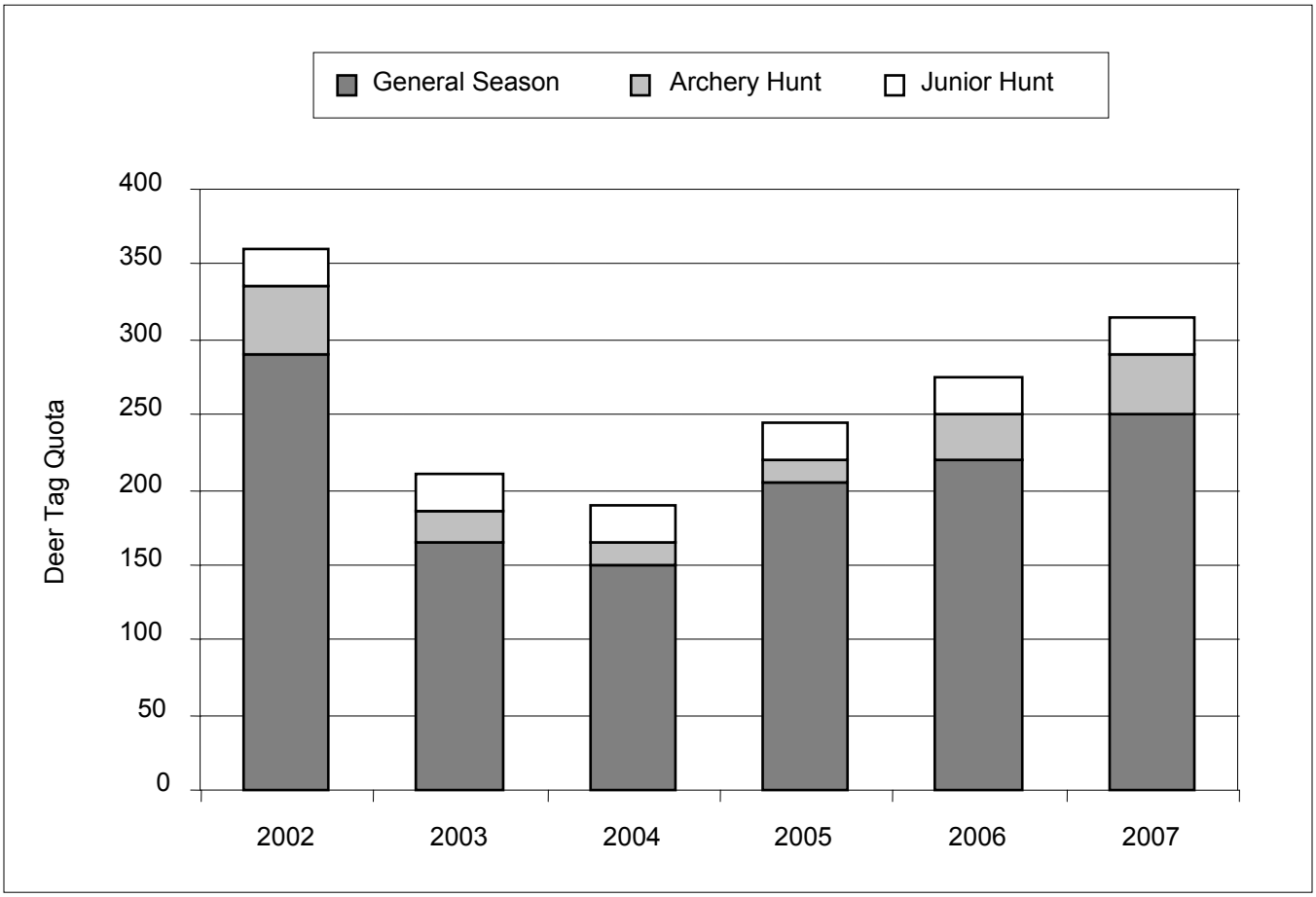
The Regulations provide management direction for lands associated with hunting activities on federally and state-owned lands in California. The Regulations include hunting license provisions and requirements, application and fee information, hunting practices and regulations, permit requirements, and firearms and archery equipment regulations in each hunting area.

AVWA and SCWA are designated as Type C hunting areas by the Regulations. As Type C hunting areas, a permit or pass is not required for most uses. Special regulations for AVWA have established July 1 through January 31 as hunt days during open seasons for authorized species (Title 14, Section 551[q]).

As noted above, both AVWA and SCWA are within Deer Zone X-7a. Deer hunt tags for X zones are distributed during a special Big Game Drawing held each June, according to an annually variable quota. The deer tag quota will vary from year to year based on the health of the deer herd in the area and the number of bucks available for harvest. The general season quota for Zone X-7a has ranged between 150 and 250 tags during the past five seasons (Department 2007c). Prospective hunters pay an application fee to participate in the drawing. The general season for deer opens on the first Saturday in October and extends for 16 consecutive days. The general season tags allow hunting during the general season only, using a muzzleloading or centerfire rifle, shotgun, authorized pistol or revolver, crossbow or bow (Department 2007a).

Additional tags are issued each year for a Zone X-7a Area-Specific Archery Hunt and a Junior Hunt. The Archery Hunt begins on the third Saturday of August and extends for 23 days; the Archery Hunt quota for Zone X-7a has ranged between 15 and 40 tags during the past five seasons (Department 2007b). The Junior Hunt (open to hunters less than 16 years old with a Junior Hunting License and accompanied by an adult 18 years of age or older) is scheduled for the same period as the general hunt, but is an either-sex hunt. The Junior Hunt quota for Zone X-7a has been 25 tags each of the past five seasons (Department 2007b).

The graph below illustrates the variation in Zone X-7a deer tag quotas for the general, Archery and Junior Hunts between 2002 and 2007.



Source: Department 2007b, 2007c

Zone X-7a Deer Tag Quotas **Exhibit 3.5-1**

The bag and possession limit for the general season and the Archery Hunt is one buck, forked horn or better, per tag; for the Junior Hunt the limit is one either-sex deer per tag (Department 2007e).

The Regulations also specify hunting seasons within Class C wildlife areas for resident small game mammals such as rabbit, fox, and tree squirrel; nongame mammals such as bobcat, coyote, skunks, raccoon, and opossum; and game birds such as dove, quail, grouse, and turkey. Hunting and trapping of furbearing mammals such as beaver, mink, muskrat, and raccoon is permitted during designated seasons. Skunk and opossum may also be taken at any time of year (Department 2007e). Trapping of furbearers requires a trapping license. Allowable methods for commercial and recreational trapping have been greatly restricted in the state since 1999 following voter's approval of Proposition 4, and leg-hold and other forms of body-gripping traps are prohibited (Department

2007f). Hunters taking resident or migratory game birds such as quail, grouse, turkey, and mourning doves must have a current state upland game bird stamp (Department 2007g).

The Regulations permit bear hunting in the area of the state encompassing AVWA and SCWA during a season opening on the second Saturday in October and extending 79 consecutive days, or fewer days if the Department determines that 1,700 bears have been taken (Department 2007e).

3.5.7 FISHING REGULATIONS

All anglers must display a California Sport Fishing License on their outer clothing while fishing. Resident and nonresident anglers may choose from one-day, two-day, 10-day, and annual licenses. In addition, Title 14, Chapter 3 provides special regulations relating to trout fishing and designates Sierra County as part of the Sierra District for the purposes of those regulations. Section 7 designates season and bag limit regulations for trout species within the Sierra District. Open season on the streams within AVWA and SCWA begins the last Saturday in April and extends through November 15. The limit is five fish per day and no more than 10 fish in possession (Department 2007h).

3.6 FIRE AND TIMBER HARVEST

Historically, the entire region within and around AVWA and SCWA was covered by coniferous forests consisting of large fire-tolerant species. These forests experienced wildfires about every 10 years. These frequent fires kept understory fuels low which, in turn, resulted in fires of low intensity. In the late 1800s and early 1900s, the forests were logged, and logs were removed using railroads and donkeys. Regional timber was used in California gold mines, in the Nevada Comstock mine, and for construction of the transcontinental railroad (Noxon, pers. comm., 2007). As a result of those timber harvest practices and subsequent fire suppression practices, fire intolerant species such as incense cedar and white fir grew abundantly in the region and fuels have become excessive. In addition, because the area is close to timberline and very dry, healthy forests do not regenerate quickly on their own within a severe fire scar area. Rather, these burnt areas typically require active restoration to rehabilitate the forests (Rinella, pers. comm., 2007).

Large wildfires near the wildlife areas threaten people, firefighters, houses and commercial structures in Sierra Brooks, Loyalton and other communities, and ecosystem functions. Large wildfires can be costly and destructive. They reduce recreation values of the region, harm timber resources, cause increased erosion and flooding, degrade habitat, and require expensive reforestation.

Two major fires have occurred in AVWA, SCWA, and surrounding forest land. The Cottonwood Fire, which occurred in 1994, burned 2,000 to 3,000 acres in the eastern and southern portions of the wildlife areas, and approximately 46,000 acres in the region. The Harding Fire, which occurred in 2005, burned approximately 600 acres in the wildlife areas, and about 2,000 acres in the region (Lidberg, pers. comm., 2007). Both fires were caused by people, although lightning fires are also common in the area.

The Tahoe National Forest (TNF) harvested many small insect salvage sales around the AVWA prior to the Cottonwood Fire. During the spring of 1995, after the Cottonwood Fire, an emergency timber harvest plan was approved and harvested, including portions of both wildlife areas. This salvage removed most of the fire-killed timber from the region. Because the Cottonwood Fire was a continuing source of environmental problems in the Antelope Valley watershed and elsewhere, the USFS attempted to stabilize the area as part of their salvage mitigation (CAL FIRE 1996).

3.6.1 TIMBER HARVEST PLAN

In 1996 a Timber Harvest Plan (THP) covering much of the AVWA was approved to harvest timber from 967 acres. The objective of the harvest was to develop the existing even-aged young growth stand of healthy trees in the 12”–24” DBH class using a commercial thinning prescription. This was applied to promote timber growth and improve forest health as per 14 CCR 933.3 (a) (CAL FIRE 1996). The goal of this timber harvest was to enhance deer habitat and reduce fire hazards by promoting a more natural forest ecosystem (Lidberg, pers. comm., 2007). The thinned stand consisted of a homogeneous 120 to 180 year old CAL FIRE Site III ponderosa pine forest with basal area averaging 220 sq. ft. (basal area is a measure of stand density developed by foresters. It is the total cross-sectional area of the trees in a stand, at breast height [4.5 feet above the ground], measured in square feet per acre). Thinning reduced stocking levels to no less than 75 sq. ft. of basal area, retaining healthy dominant trees from the preharvest stand. It was anticipated that the postharvest stand would experience a release in diameter growth due to the improved conditions created by eliminating conifer competition (CAL FIRE 1996).

The Department requested and received an extension on the THP, which otherwise would have expired in 1999, and timber harvest was completed in 1999, 2000, and 2001. The Department also prepared a collection agreement that reserved a percentage of the timber harvest receipts (approximately $30,000) to pay the Sierraville Ranger District to conduct prescribed burning in 2002 (Lidberg, pers. comm., 2007).

Some of the positive results of the timber harvest and prescribed burning were realized when the Harding Fire broke out in 2005, three years following harvest. The hot, high fire dropped to ground level and lost intensity

when it reached the treated areas of AVWA, facilitating its control by fire fighters and preventing its spread to Loyalton or the Sierra Brooks development (Lidberg, pers. comm., 2007).

3.6.2 FIRE RESPONSE

Fire response in the wildlife areas is the responsibility of the Sierraville Ranger District, part of the TNF. The Sierraville Ranger District uses the universal Incident Command System, a defined emergency response protocol, to respond to fire emergencies in the region. The Sierraville Ranger District is responsible for Incident Command, although CAL FIRE (Truckee Fire Station) is a Cooperating Agency and is called in to help as needed (Noxon, pers. comm., 2007).

The designated Incident Commander during a fire event is the Sierraville Ranger District Fire Management Officer or one of four other Duty Officers (two at the Sierraville Ranger District, two at the Truckee Ranger Station), depending who is on call at the time.

The Incident Commander is in charge of managing all aspects of a fire response. All other incident response positions are assigned to appropriate emergency response personnel (including members of cooperating agencies) depending on who is available at the time of a fire event. The Operations Section Chief develops the daily fire-fighting plan and directs the emergency response people. The Logistics Section Chief plans for and arranges fuel, food, water, sleeping arrangements, etc. The Plans Section Chief implements the daily plan put together by the Operations Chief, ordering the people and equipment needed at specified locations. If a very large fire occurs, a preassembled Incident Management Team can be called in from locations around the country (Noxon, pers. comm., 2007).

The regional Emergency Command Center (ECC) is located in Grass Valley. The ECC maintains emergency response staffing plans, dispatch plans, and an emergency response computer program called WildCAD. When the ECC receives a report of fire, the WildCAD program assimilates specific variables (such as the size of the fire, its location, weather conditions) and prepares a response plan detailing specific resources needed to fight the fire (e.g., specific equipment and staff from specific locations). The ECC dispatches these resources, and the Incident Commander modifies the dispatch as needed according to the progress of the fire. The ECC or the TNF Nevada City office would be responsible for notifying the Department of a fire on their property. The Sierraville Ranger District has an agreement with the local school district to use their facilities as an incident command post in the event of a fire. They also have data outlining potential water sources, access points, evacuation routes, staging areas, and other information that may be necessary for responding to a fire event (Noxon, pers. comm., 2007).

3.6.3 FIRE MANAGEMENT PLAN DEVELOPMENT

Although the TNF has a process established for responding to a fire in the region, an AVWA and SCWA Fire Management Plan is needed to manage the wildlife areas to restore a fire tolerant forest with high quality habitat values, and to guide responses to fire emergencies. The development of a Fire Management Plan would include compiling and developing fire response information that is specifically relevant to the wildlife areas. It would include guidance for on-going timber, fuels, and fire management within the wildlife areas with a goal of returning the forest to a natural age structure and species composition. It would also guide coordination of fire preparedness and response with local and regional fire management agencies. Preparing a Fire Management Plan has been identified as a “step-down action”, a term used by the Department to describe an activity that is currently beyond the scope of the LMP and will require additional effort following the preparation and adoption of this LMP.

Tasks have been included in the Fire Management Element (see Chapter 4) of this LMP to facilitate the coordination of fire preparedness and response with local and regional fire management agencies. In addition to implementing these tasks, development of the Fire Management Plan would include a review of the Herger-Feinstein Quincy Library Group (QLG) Forest Recovery Act Pilot Project Environmental Impact Statement (EIS)

and the Sierra Nevada Forest Plan for potential applicability to the wildlife areas. Although the QLG project is primarily a prescription for resource management (including fuels management, special status species protection, and habitat restoration) on Federal lands, it may be indirectly applicable to the wildlife areas because the Sierraville Ranger District follows this prescription in managing the surrounding TNF lands, and they are responsible for fire response in the wildlife areas. The QLG prescription may be a useful reference in defining an on-going timber, fuels, and fire management prescription within the wildlife areas.

In addition, the Fire Management Plan should include information such as:

- Water sources
- Access information including road access (labeled on maps and signage in the field), gate access, and available helicopter landing zones
- Evacuation routes
- Contact list
- Maps to distribute to cooperative agencies
- Predetermined command post options such as a community center, school, church, parking lot, or field site.
- For potential command post options, obtain 24-hour contact information and record what resources are available, such as:
    - parking area
    - equipment available
    - power capabilities
    - number of phone lines
    - satellite dish
    - internet